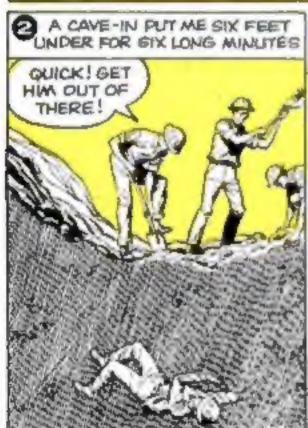


BURIED ALIVE!







IN THE HOSPITAL, I HAD





I.C.S.CAREER KIT

Send coupon now... get all three books

INTERNATIONAL CORRESPONDENCE SCHOOLS
BOX 213148 SCRANTON 15, PA.



HIGH SCHOOL

C Kigh School Diplorts

Professional Engineer (Chem)

Pulp and Paper Making

Auto Engine Tanono

Auto Technicism

MADIO, TELEVISION

... Working Hours

Canadian residents send coupen to International Correspondence Schools, Canadian, Ltd., Mandreet, Canada. . . . Special taition rates to members of the U. S. Armed Forces.

Warping and Wasving
Warping Manufacturing

Popular Science Monthly

February, 1958

Cover photograph by Harry Walton



What's this man doing?
Looking for spies. Here's the inside
story of espionage in Detroit



Now U.S. scientists hope to rocket into space a see-all, know-all TV eye. Target date: any time . . . soon

15-PAGE COLOR SECTION

PS Eyewitness Report: Inside Russia by Car · 90

AUTOMOBILES

Thunderbird Now Totes Four · 118
Chrysler 300D Has Built-In Roar · 122
How Auto Makers Spy on Each Other · 133
What's Your Driving IQ? · 211

PS SHOPPING REPORTS

The Right Battery for Your Car · 172 What's New

- For Your Car · 180
- ▶ For Your Leisure Hours 181
- ▶ For Your Home 182
- ▶ For Your Home Shop · 183
- For the Home Handyman · 183

WORLD OF SCIENCE AND INDUSTRY

TV Satellite to Watch the World · 105
Will the Sun Heat Your Next House? · 110
The Robot That Runs a Railroad · 114
Hot-Water Heat Without Radiators · 124
The Building One Man Can Carry · 130
What Science Knows About Headaches · 137
How We May Get H-Power · 164

Editor: HOWARD ALLAWAY

Managing Editor FRANK ROWSOME JR.

Assistant Managing Editors Charles M. Garvey Kendall W. Goodwyn Robert P. Stevenson

Senior Editors
Deven Francia
Martin Mann
Everett H. Ortner
Harry Walton

Technical Editor Hubert Luckett

West Coast Editor Wesley S. Griswold

2 POPULAR SCIENCE

Associate Editors

Erik H. Arctender Alden P. Armagune Henry B. Comstock Frank Dorr Sheiden M. Gallager Herbert O. Johannen Herbert R. Pister Maryann Smith Ruth Westphal Richard A. Yahrana

Editorial Assistants

Rosa Lee Beeland (Chief)
Annutta Krause (Research)
Anna Dallas, Bebe Lipson,
Roberta Marks, Georgette Sparks

Art Director HOWARD C. JENSEN

Art Editors

Herbert Anthony Reginald A. Hawley Harry Samuele

Art Associates

Al Heighington Eric A. Karminski Jr. Honey W. Karmirowski Richard J. Meyer Dana B. Ramussen

Photography

W. W. Morris (Chief) Robert D. Borst Orlando Guerra

America's Leading New-Idea Magazine for 86 Years

SPECIAL FEATURES

Correspondence Schools: Plain Facts · 126

Biggest Boom in Music * 156

1 Flew 1,900 M.P.H. · 160

What Can You Pay for a House? . 194

Gus Gives a Competitor the Business · 218

Transistors Power Servo-System Hi-Fi · 222

THE NEWS IN PICTURES

Jet-Age Air Terminal Is Soundproofed · 142

New Hull Makes Copter Amphibious · 149

Development House Has Indoor Pool · 150

He Boils Metal to Get Electricity * 155

FOR HOME AND SHOP

Home Incinerators Burn Their Smoke · 177

Four Bargain Tables from Flush Doors · 184

Light Your Home with Remote Switches . 189

PS Fix-It File: Tool Handles . 199

Wordless Workshop · 202

The Remedy for TV Interference · 204

Short Cuts and Tips · 223



Take off with Lt. Col.
Frank K. Everest Iv.—"the
fastest man alive"—for
a record-shattering
assault on time and space



Choose the table you like, build it in one evening, Cost; low, Muterials; simple stock lumber and a flush door

Another PS exclusive: Monthly price reports on things you buy

For the honest retail prices of the things you buy, read the new Popular Science Price Report. It tells you what to buy, when to buy, what to pay. Check it this month and every month in: You Ought to Know · Page 21

Publisher RALPH H. FLYNN

Advertising Manager Lee P. Adams

Circulation Director
EUGENE WATSON

EDITORIAL OFFICES; 1/3 Fourth Ave., New York 10, N.Y.

ADVERTISING OFFICES:

NEW TORE-353 Fourth Ave.
CHICAGO-360 North Michigan Ave.
DETROIT-820 Book Bldg.
SAN PHANCISCO-311 Sansome St.
CLEVELAND-636 B. F. Keith Bldg.
LOS ANCELES-7127 Wilshire Blvd.
PORTLAND, ORE.-520 S.W. Sixth Ave.

SUBSCRIPTION SERVICE

Address all subscriptions and correspondence concerning them to: Subscription Department, J53 Fourth Ave., New York 10. N. Y. Allow four weeks' notice for change of address. Please give both old and new addresses, including some aumbers.

Published monthly at 353 Functh Avenue, New York 10. N. Y., by Popular Science Publishing Co., Inc., Godfrey Hammond, Chairman of the Bogrd Ratph H. Flynn, President and Treasurer; Franklin E. Parker Jr., Secretary: Engene Watson, Vice-President, Second-class mail privileges authorized at New York, N. Y., and Dayton. Ohio, Entered as second-class matter at the Post Office Department, Canada. Printed in U.S.A. Copyright, 1958, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all the countries participating in the International Copyright Convention and Pan-American Copyright Convention, Single copy 35c. Subscriptions to United States, its possessions, and Canada, | year \$3.40 12 years \$6,00, 5 years \$8.00). Elsewhere, 1 year \$6.00 (2 years \$11.00. 3 years \$16.00),

PS Readers

TALK BACK

For Better Science Labs

Your article, "How Good Are the Science Labs in Your Youngster's School?"
[Nov.], should be of assistance to schools and teachers who are trying to improve their lab facilities.

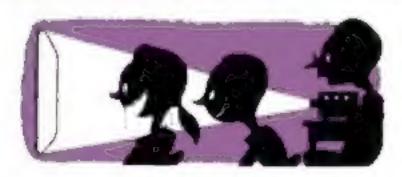
Since it is directed to parents, it should reach an important audience. It is well known that schools can have what their communities want them to have.

We are pleased that you saw fit to give space in POPULAR SCIENCE to this topic.

JOHN R. MAYOR, Director Amer. Ass'n for the Advancement of Science, Washington, D. C.

equipment in high schools, noted in your article, is obviously not going to be solved with one sweep of a wand.

But I wonder why science teachers have not made more use of film to teach



difficult concepts? Film strips can bring the equivalent of thousands of dollars' worth of apparatus into the classroom. Science educators should stop considering film strips a class respite or entertainment. Used side by side with textbooks, they can do a wonderful job of teaching science—without expensive equipment.

H. M. STONE, NYC

Running TV Chassis into the Ground

Your suggested safety check for TV sets, to insure that the neutral house wire goes to the chassis ["You Ought to Know," Oct.], was good, but I'd like to add a point.

The screw in the outlet cover is not always at ground potential. Often, in home wiring, the metal box, screw and plate are floating with no ground connec-



tion at all. This could lead a well-meaning but uninformed person into a feeling of security where none exists.

Most neon voltage testers will indicate the hot side by a glow when one tip is held in the fingers and the other is applied to the receptacle holes—and no harm will come to the person holding it.

L. D. BOYLES, Portland, Ore.

Good point. Metal outlet boxes should be grounded but often are not. Connect the tester between the chassis and a ground point that will make the neon glow brightly for one position of the plug. Then reverse the plug. Leave the plug in the position that does not produce a glow. Even this method is not foolproof. Some sets will check okay when turned on, but check hot when turned off. The only solution here is to orient the plug properly when the set is on and pull the plug when it is off.

Back-Seat Lament for '58 Car

Those gleaming '58 vehicles in your recent issues look good in four-color pictures, but brother, they don't feel so good. We just got home from a 2,000-mile jaunt in a friend's new car. Its owner (bemused by his privilege of paying \$80 a month for 36 months) thought it behaved fine. My wife and I thought the old sedan in our garage at home—roomy, reliable and paid for—never seemed sweeter.

The '58s just don't make any sense. This convertible we rode in was about 18 feet long and had a trunk big enough to hold a spinet—but there wasn't enough room in the back seat for human beings over the age of 10. Some "sales engineer" had padded the instrument panel—but left untouched two lethal roof latches on

4 POPULAR SCIENCE

THIS FREE SAMPLE LESSON

will prove that you can become an expert

ACCOUNTANT...AUDITOR

OR CPA

FREE SAMPLE LESSON

We offer you this free sample lesson so that you can prove to yourself that you CAN master Accounting quickly, thoroughly—in spare time at home.

You will see exactly how LaSalle's famous "Froblem Method" works...how you are led step-by-step through actual accounting work—learning by doing and not by study of theory alone. First you tackle easy problems, then more difficult ones—until soon you muster them all. And at every step you have the close personal guidance of LaSalle's large staff of expert accountants and CPA instructors,

One out of every 13 of all CPAs in the U.S. has been trained by the LaSalle Problem

GOOD-PAY JOBS IN 6 BIG FIELDS

Method

If you were an expert accountant right now, chances are you would find yourself in one of the best paid fields of business.

There are several big fields of opportunity open to men and women trained in accounting...opportunities that are wide open and highly inviting, offering maximum income and job security in good times or bad. And under LaSalle's "Problem Method" you can start earning while still learning—either in spare-time or full-time employment...or in business for your-aelf with no capital required.

Get the latest information by sending for our illustrated booklet. "Opportunities in Accounting"—plus free sample lesson. The coupon at right will bring both to you without cost or obligation. LaSalle Extension University, 417 S. Dearborn St., Chicago 5, Illinois.

This well-paid LaSalle-trained Accountant's success could be years.

Accounting Training

Basic Accounting

THE MALANCE SHEET

of "Source Prairies University of all "Caso J. Himon

THIS SAME LESSON HAS STARTED HUNDREDS
OF THOUSANDS toward well-paid accounting
coreors—in business, government, and public
practice as CPAs. Even without provious knowledge, progress is rapid—corning power climbs
fest. This sample lesson will show you why.

If you have been envying the high incomes and good jobs enjoyed by thousands of men and women Accountants today...incomes ranging from \$5,000 to \$10,000 and more per year...why not launch such a career for yourself?

Do you doubt that you can?

Then let us send you—without cost or obligation—the same Lesson Number One with which
LaSalle has started several hundred thousand men
and women toward successful accounting careers.
We want you to see for yourself how this remarkable method, originated by LaSalle, makes Accounting simple, interesting, practical, and certain...how
it leads you step-by-step to a complete mastery of
Accounting—and on up to the Certified Public Accountant Certificate if you so aspire. It doesn't matter

whether you've had previous bookkeeping experience, or whether you don't know a debit from a credit. Whether you wish to qualify as an expert accountant, advanced accountant, cost accountant, auditor, government accountant, income tax specialist, or public accountant...you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and inexpensively—in spare hours at home—without losing a day from your present job.

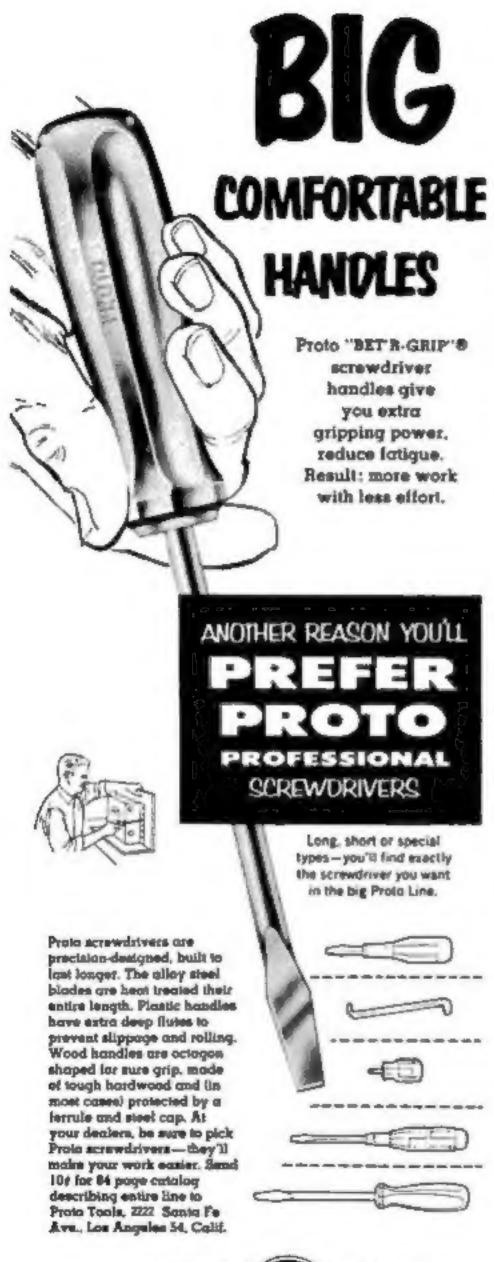
So right now, today...if you are an adult, employed, and earnestly ambitious for rapid advancement in one of the highest paying fields of business... send your name and address on the coupon below. We'll send you the free sample lesson—plus our illustrated book outlining today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward greater success. It can do the same for you. Mail it today!

	ands toward greater success. It can do the same for you. M
t today!	Accredited Member, National Home Study Council
	Clip Coupon Mail TODAY!
LaSalle	Extension University A Correspondence Institution
Dept. 28	3H, 417 S. Dearborn Street, Chicago 5, Illinois
YES, I wi	ant to see how LaSalle's "Problem Method" works

YES, I want to see how LaSelle's "Problem Method" works... Send me free sample lesson—also your book, "Opportunities in Accounting"... without cost or obligation.

City, Zone & State.







the windshield header. And the boltstudded steel top supports, by the rear seats, were just three inches away from your temples.

Acceleration was terrific—and so was brake fade. After parking, we found that getting out was no harder than escaping from a sunken sub, except that you didn't need a Momsen lung. Two tall, raked antennas sprouting from the rear deck made us look as if we were cruising offshore for



tuna. On the seat backs inside, on the stunning gold-and-silver metallic upholstery, were decorative enameled buttons the size of walnuts. These shortly produced identical-sized bruises on passengers' backs. This kind of idiocy can only be explained by my theory that a bunch of appearance-crazy designers have taken over in Detroit.

R. L. HALE JR., Lake Charles, La.

Gus Makes Problems in Far East

In the August Model Garage story, Gus speaks about a possible frozen wheel-cylinder piston, so it must be freezing cold. But the picture shows the men in summer clothes. Besides, the heat generated by the shorted stoplight would warm the cold master-cylinder housing.

Further, Gus says the shorted switch made the brake fluid boil. Then how could the pedal plunk to the floor without any effect? All four brakes would be blocked because of the expanding action of the boiling fluid. The brake pedal would certainly not plunk to the floor.

I have never met a case like this, and in my opinion one will never occur.

> R. Woerisman Keajoran, Indonesia

Please excuse Gus's use of Yankee trade lingo. To American mechanics, a "cocked and frozen" wheel-cylinder piston means a piston stuck in the cylinder for mechanical reasons, not one literally frozen by the outside temperature.

Air in a brake line will cause brake failure when compressed so that it doesn't transmit the full effort applied to the

Train at Home for SUCCESS in RADIO-TELEVISION



You Learn at Home by Actual Practice

With NRI kits you build actual Radio TV circuits and testing instrument. Practice locating and fixing Radio TV troubles. Learn soon to earn extra money.



Good Jobs in Radio-TV

NRI trained men hold good jobs as operators and technicians in Radio and Television broadcasting stations, with Police, Marine and Aviation stations, Interesting work, good pay.



There's Good Pay in Radio

NRI trained technicians are needed, paid well, to help maintain 150 million home and auto Radios, 38 million TV sets. Color TV. Hi-Fi adding opportunities. Excellent field for spare time earning.

Join the thousands N.R.I. has trained for Successful Careers in Radio-TV

Get the benefit of NRI's 40 years experience training men for success in this field. Get personal attention of experienced instructors. Also get practice with Radio-TV equipment—learn by doingwith kits supplied as part of your course. Courses are easy to learn. Most successful NRI men start without any knowledge of Radio, many without a high school education.



Find Out What Radio-Television Offers You

As a trained Radio-TV Technician, you are prepared to supply much needed services. The technician is a respected and appreciated member of his community. Get Sample Lesson FREE, See how practical NRI has made learning at home, Mail the coupon. You also get 64 page Catalog telling about NRI, the lessons, equipment supplied, instruction services.

N.R.I. TRAINED THESE MEN FOR SUCCESS



and have a good spare time Hadio TV service bendaria fust opened new shop." (. W. Liwis, Pecsacola,



"Beer building License and Logitorer station Walth orateful to N. h. I. R. D. All NOLD, Rumford, R. t.



"Enrolled while ment man-het manurer, too, service-man leb. In a year my pay too reased 20%, "C. CAH-TER, but Bernerdino, Calif.



"Move a Radar Jon, Also do spare time Radio-TV servicing Have my own amareur Radio station." F. ZAWAKE, Scranton, Penda

Added Income Soon-\$10, \$15 a Week in Your Spare Time

Soon after enrolling, many NRI students earn \$10, \$15 a week extra fixing sets in spare time. Vacuum Tube Voltmeter you build with parts we send helps you locate and fix troubles. Special lessons show you how. Many students use spare time earnings to pay for their training, and provide capital to start their own businesses when they get NRI Diploma.

Color TV Making More John

and spectacular growth. Number of trained men employed has increased each year. Color TV and Hi-Fi are late developments creating need for more technicians. The future is very bright for trained men. Find out how you can get ready at low cost, on easy terms. Send for FREE Sample Lesson and Catalog. Mail coupon—National Radio Institute, Dept. 888, Washington 16, D. C. Radio-Television is an industry noted for continued

VETERANS-Approved under GI Bills



MAIL COUPON TODAY

NATIONAL RADIO INSTITUTE Dept. 232, Washington 16, D. C.

Mail me Sample Lesson and 64-Page Catalog. FREE. No Salesman will call. Please write plainly.)

City____State__ ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL



Train at Home for AUTO a Top-Pay Job in AUTO MECHANICS

Skill adds many extra dollars to your pay check. This is especially true in the auto field, where 100,000 mechanics are needed. Average pay in some areas is \$3 per hour. It's easy to train at home in spare time for a secure job with a bright future, in America's No. I industry. Mail coupon for full details. No cost nor obligation.

Get Experience Using Tune-Up Kit & Tools







CTI sends you a Tune-Up Kit, the kind that skilled mechanics use to locate engine troubles. You receive a compression Tester; Vacuum Gauge & Fuel Pump Tester; Ignition Timing Light: portable steel case. You also get mechanic's tools, including socket set. You negular experience using kits.

DIESEL MECHANICS OR BODY-FENDER REBUILDING is yours at no extra cost. Only CTI offers this extra choice. You get fully-rounded training in all phases of mechanics.

Many Students Earn Money as They Train

by taking part-time jobs in local shops or fixing cars "on their own." Many make enough to pay all tuition and buy extra equipment. Some open shops, become independent.

Get Facts Now—Decide Later

Your future is worth looking into. Get facts on job and business opportunities. Mail coupon today—Commercial Trades Institute, Chicago 26, Ill.



COMMERCIAL TRADES INSTITUTE

1400 GREENLEAF AVENUE CHICAGO 26, ILLINOIS

DEPT. A-739

Send booklet, Big Money in Auto Mechanics, and Sample Lesson, Both are FREE.

Age	
	Aa+

City_____Zone__Stole.__



brake pedal. Boiling brake fluid creates gas or vapor in brake lines, and this acts like air in reducing brake action.

PS Booklet Used as Textbook

Your Car Conks Out" [July], is proving to be a valuable aid to us in our auto

shops. This is especially so in the light of our objective: to make the student a future intelligent user of the automobile. The well-illustrated articles in this pam-



phlet, dealing with the auto failures most frequently encountered, have served to stimulate the students in their work.

JOSEPH J. PORTLE, Principal Washburn Voc. H. S., Chicago

Decimal Point Lowers Wow

Somehow or other, in submitting the data on flutter and wow on our model 1960 recorder, we neglected to put a decimal point in front of the numeral three. Thus in your chart covering tape recorders [Nov.], instead of reading .3%, it appears as 3%. I do hope a correction can be made somewhere in your pages.

DAVID LIBSOHN, Telectrosonic Corp., Long Island City, N. Y.

Feeding the Free-Piston Engine

READING your article on the free-piston engine back in September raised a question in my mind that I've been unable to solve to this day. Can you help me?

In a conventional diesel engine, fuel must be injected in the proper amount at the precise moment. How is this accomplished in a diesel free-piston job when there is no positive mechanical movement to actuate the injector?

WILLIAM M. FULLER, San Antonio

Ford engineers explain: The fuel pump on their free-piston engine is driven by the oscillating synchronizing gear. (The engine has no rotating parts to drive the pump.) The synchronizing gear oscillates from standstill to maximum velocity at about midpoint of piston travel. At this maximum piston velocity, the injection pump feeds fuel to the fuel line. But the line is coiled and 15 feet long, so fuel delivery at the nozzles is delayed until at or near inner dead point of piston travel.



Learn at Home SPARE TIME to Fix Electrical Appliances

knowing a good trade. Servicing electrical appliances offers that OPPORTUNITY. Every wired home has an average of 8 electrical appliances. Up to 10 million new appliances are sold every year and owners pay well to keep them in repair. That's making a fast-growing need for trained men.

Start Soon to Earn \$3, \$4, \$5, an **Hour Extra in Your Spare Time**

Start soon to fix electric toasters, clocks, fans, vacuum cleaners and other appliances for neighbors and friends. Work in your basement, garage or spare room. Pick up \$3 to \$5 an Hour extra that way. It's easy to increase your earning power-to pay for this training many times over with your spare time earnings.

Learn and Earn with Multi-Use Tester Built with Parts We Send

This course includes the parts to build a portable, sturdy Appliance Tester that helps you locate electrical defects quickly and easily. You use it to learn and do actual electrical appliance repair jobs. If you want better pay learn this good trade. No need to give up your present

To build a better future, get into a field where there's job. You can train at home in your spare time for only much important work and the security that comes from \$2.50 down and \$5.00 a month. A small price to pay for increased earnings, a more secure future. Paste coupon below on a 2c postal or mail in envelope for free book and sample Jesson, Address National Radio Institute, Dapt. BBS, Washington 16, D. C.

2c TO MAIL THIS	
COUPON MAY START	Lance S.
YOU TO SUCCESS	10
LESSON AND BOOK	PLECTOCAL
FREE	

FKEE	171
MATIONAL RADIO INSTITUTE, Dopt. 880. Weshington 16.	D. C.
Please send me Electric Appliance Training lesson and free. (No salesman will call.)	DOOK I
Name	
Address	
CityZoneState	
ACCREDITED MEMBER NATIONAL HOME STUDY COUN	CIL

Selling Stock At Sacrifice!

NEVER BEFORE SUCH LOW PRICES!

Clearing out \$210,000 worth of stock at sacrifice prices. All new, first-quality merchandisa. This is our famous tunnary elearance-which means LOWEST PRICES YET' Stock up now first came, first served. Your manay back if you're not satisfied. Rush coupon below for PROMPT service. THORESEN, Inc., Dest. 7-B. 585 Water Street. New York 2, N. Y.

Price Slashed!

BEAUTIFUL NEW ZEPHIR ONE OF THE WORLD'S

TIMEPIECES

REGULAR PRICE! 7.98

★ Looke Like \$75 00 Watch

★ 14 Karat Gold Color

* Raised Gilt Hands and Numerals

★ New 1958 Model from Switzerland

Here's the most febuleus worth value in America. Famous Zeable ultro-thin watch-25,000 recurrily sold at \$7 98-raduced again to only \$5 99 plus lox for QUICK SELL-OUT? This is the new 1958 model, perfect in every detail; described by customers in words like those "A rare 9 Wel | 171 * My friend thought I poid at least . *Keeps \$50.00 for It1' accurate time!" 14 horot noted color Raised gift

hands and numerals. Preriston Swiss import. Beoution to win new customers poid. NO 2100.

this low price you getfamous thoreton on imited Guarantes el from serv tee, free an-nual alting, free adjust monts for lifetime of them!

tiful feather strop. This is a TEMPORARY price reduc-IPrice subject to change without notice | Den't less out on this sensational value. NO 210 5 99 plus and federal for TOTAL 6.59 Special! Save \$3 on Daluan Madel with 14 Karat Geld color expansion band. Theusands sold at \$10 99-yours for 7 99 lost-

POCKET WATCH |

No fancy dlamend dial or water thin case no alligator er golden band, ne gtush velvet gift

box-and so funcy only 12 58 buys this runged, old fashioned railroad-type watch if you want an old timer that coukes interest—and keeps good bry this old 'choo cheo watch. Guaranteed. NO. 251 2 98

SWISS ARMY Type 10-in-1 Knife

50,000 Sold 🚿 ot \$3.98

Big! B inches lang whenopen. 10 practic M tuple in one Saw File Cock-Rniin Can Opener Awi, Screwdelver. Uti ity Kalle. Sottle Opener. Scissors All

sang to open & close. No lamming he slipping Replaces multitude of soil & gadrets can't find when needed. Rugged Kertam sleet ha. 18. Now 1 98

Giant 1958 Powerhouse



focus New switchen for the focus of the switches of the switch

50.000 sold at higher prices - now dely 7.77 Water And shock result in that protect thick protector Amb. Mag-netic States (FBS State) back Eween second hand Laminous di-al Runs Mn-der water TWICE the M

WATER! al Runs and der water Eym II we charged Twice the price we couldn't give you a more accurate watch Famous Thorearn Unlimited Guarantes of tree service office adjustments for literamy of this firm. No. 263 7 77 plus Tac Federal tax Total: \$ 55 Special Defuse Model with metal expension band Res. \$11—enty \$10 tax add No. 2630

Stainless Steel Steak Knives

Famanic value Adv. in Moute Beautiful "TheAmericanHome" "The American Home" of One One mirion sold of prices of 33c fm \$3 00 oach. New slaved to only 25c kg lets of 4 New, first-quality, 0c+d history hue handles. Breathtaking design stainless sleet feer raird pages never need sharpening 10-year replacement. TOTAL PROPERTY NO. 824



RUNS

UNDER

Black Forest **Hunting Knife**

Reduced Again!

piec 12e for Sheath

Another price stank of the world a most popular hunting knite, 100 boo sold at 33 98. Thoroson ctrl price on replica to 31 25 few we can price to boly she blue 12c for theath, Rugged Morium alrel. Mearly 10 inches tong. You'll marvel at sculptured style of handle, A real champion No. 75. 31 complete.

Vest



"This Insulated MAIL COUPON! MONEY BACK GUARANTEE 1

than 10 Sweaters!"*

DuPost Docros Fiberfill Gives Warmth without Weight!

Adv. pt

\$13.95

SAVE 16.00. New hunting vest with 3-Ply insulation Same vest featured in \$13 95 -- our price \$13 95 -- our price ? 95 Featherwe and yet gives same projec-tion at 10 swraters

writer one customer Extra-large alpher that can't fraeze. Extra-large ripper that can't freezy, Two bugs roomy pockets with inside elastic shelf loops. Wathable. Orients: Extra Keeps shape, Long 'libered insuistion by DuPont. Duringoof. Motheroof. Non Allergic. Full surchass price related if you don't agree it's worth nearly TWICE (he price. Red for Brown Extra small (32-14); Small (36-38); Medium (40-42); Large (44-46); Extra Large (48-50). FREE 10-day trial. No. 33. Feels



THORESEN, Inc., Dept. 7-8 585 Water Street, New York 2, N. Y Righ Items below My money back if I'm not meaded *THITHAUD* ARTICLE PHICE State Size & Color where necessary. MINIMI M ORDER \$2.08 Check, money order or cash enclosed. Bend prepaid O Send COD Pais Postas fees PAINT MAME ADDRESS TOWN OR

Canadians 439 King St. West. Toronto 23t, Ont.

STAT

The month in science

What price fuel economy? The faintly discernible trend toward more miles-per-gallon in U.S. cars could be reversed before it fairly gets moving. The reason, not strictly automotive: smog. Two classes of chemicals in auto exhaust are a major cause of smog: oxides of nitrogen, and unburned hydrocarbons.

CM researchers have now figured out one way to eliminate the nitrogen oxides—at least on new, top-tuned cars. Reset the carburetor to run rich all the time—at a loss of 26 percent in fuel economy.

Today's carbs, remarkably parsimonious with gas, are linked to the gas pedal to give a rich mixture (12:1 air-fuel ratio) for maximum power while accelerating, then lean out (16:1) for maximum economy at cruising. It's the economical cruise setting that causes the trouble: Nitrogen oxide formation hits a peak.

Road tests with a rich carb (11:1) showed these results:

- Driveability not affected.
- ▶ Nitrogen oxide reduced 90 percent overall, even more during part-throttle acceleration and 40-50-m.p.h. cruising, which produce the greatest amount of these gases.
- ► Gas mileage cut an average of 4.1 m.p.g. This adds about \$70 a year to the fuel bill.
- Carbon monoxide output increased.
- ► Hydrocarbon output increased for some driving conditions, decreased for others. No clear-cut difference overall.

One problem they did not check on was maintenance. Will the rich mixture gum up the fuel-intake system, shorten valve and plug life? Another: How about older, detuned cars?

The GM research suggests these steps for a sweet exhaust:

- ► A compromise carburetor set at 12:1, eliminating 75 percent of nitrogen oxides while boosting your fuel bill \$40 a year.
- Catalysts, in the muffler or inside the cylinders themselves, to burn off hydrocarbons and carbon monoxide.
- Super-premium fuels, which generate less smog but again add to your gasoline costs.

Still unanswered: Can U.S. motorists be persuaded—by social pressure or legal fiat—to pay for the accessories and inefficient operation that a clean atmosphere requires?

Too much radiation. Scientists' increasing concern about harmful effects of atomic rays has now brought government action, as PS forecast last December (p. 21).

AEC lowered the boom on permissible radiation to its employees, to people living near atomic plants, and—for the first time—to the population as a whole.

The reduction was drastic: 67 percent. Atom workers will now be permitted an average of no more than approximately five

The month in science

roentgens a year (old limit: 15R.). Maximum exposure of other people was set at one-tenth that of atom workers.

And another step: Cut down on chest X rays to spot tuberculosis.

The U.S. Public Health Service recommended that health agencies stop mass programs intended to X ray everybody, use X rays only on people likely to have the disease.

For your next house: plastic plumbing. It's a good bet with a new type of plastic just now coming on the market.

Name: polypropylene. It looks and feels pretty much like polyethylene (the stuff used for squeeze bottles). The hig thing is its heat resistance. It can stand boiling water, could easily handle a home hot-water supply—something polyethylene can't do.

Polypropylene results from a smashing breakthrough in the science of atom-juggling. Giulio Natta of the Milan Polytechnic Institute discovered catalysts that produce orderly (as opposed to random) long chains of molecules. The molecules join together, end-to-end, with their side branches lined up, all of one type on one side, all of another type on the other side. This orderliness is what makes the difference.

Polypropylene promises big things, beyond plumbing pipes. It is somewhat lighter, stronger and more rigid than polyethylene. It's cheap, made from propylene gas, a petroleum by-product. You'll see it as housewares, machine parts, fabrics, films.

Today's only polypropylene maker: Montecatini, Italian chemical combine that underwrote Professor Natta's research. But Hercules Powder has just begun work on a plant here.

Eddy currents in the kitchen. Latest switch in the continuing effort to electrify the cook is a really different kind of stove that has no heated elements, makes the pots heat themselves.

It works on eddy currents. A motor spins a magnetized wheel under the stove's surface. This creates a changing magnetic field which induces electricity in ordinary metal pots. Eddy currents are converted to heat by the resistance of the metal.

The new system claims impressive advantages:

- ▶ It cooks twice as fast as a standard electric range.
- ► The stove itself stays cool, which means that spills don't get baked on, are easily wiped off.
- ► Kitchen is cooler because practically all heat goes into food.
- ► Cooking unit can also power a mixer-blender—a glass jar containing a magnetic rotor agitated by the magnetic field.

Don't expect to buy one for a couple of years. Tuttle & Kift, Chicago stove-component manufacturer, just imported the invention (from Germany), is now trying to sell it to range makers.

Watter Mann

FREE FACTS FOR MEN 17-55! Prepare In Spare Time For Profitable Jobs In





GUIDED MISSILES

TELEVISION - RADAR - MICRO-WAVES, ETC.

No Advanced Education or Previous Technical Experience Required!

A man doesn't even have to know how to splice a lamp cord or use a soldering from to be uligible to prepare in his spare time at home to enter the big apportunity field of Electronics. As a result, many laborers and bookkeepers, store clerks, shop men, farmers, and men of nearly every calling—have taken the DeVry Tech program, and today have good jobs or service shops of their own in Electronics.

KEEP YOUR JOB!

As you train for a good opportunity that pays real meany in Electronics, you wan't have to interfers with your present job. Your chances of propering to enter Electronics and not be held back because of the job you held today. Send coupen for full facts?

Marvels of

Satalites, guided missiles, after murvels made possible by flectronics bring us into a new are of wonderment and appartunity!

Employment Service



Puts you in touch with job appartualties—or helps you toward a better position in the plant where you are now ampleyed.

Draft Age?

We have valuable information for every men of draft ugo; so if you are subject to military service, he seen to check the soupen.

Prepare NOW

At Home or at our Chicago or Toronto Laboratories I

Itse part of the locome from the job you have today to propore at home for a highly interesting and profitable corver temorraw! Or, come to Chicago or Toronto and train full time in well-equipped Inheretories. It is probably easier then you think.

Send coupen for FREE FACTS?

"Oue of Harth America"s forgunant Electronists Fraining Contary"

According Hambur of Hutlanul Home Study Council



DeVRY TECHNICAL INSTITUTE

CHICAGO 41, (LLINOIS)

formerly DeFOREST'S TRAINING, INC.



Sample Booklet FREE!

We'll give you a from many of an interesting booklet, "Blackrawin and YOU" See for yourself how you may take advantage of the appartuables in this funt-growing field.

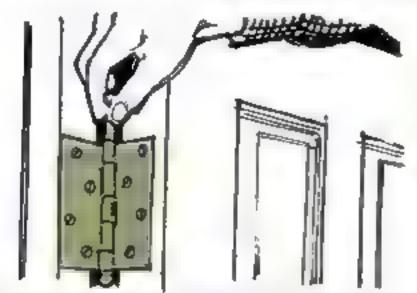
DOVRY TECHNICAL INSTITUTE

414) Belmant Ava. Chicago 41, Ill., Dept. PS-2-0

Please give one your PREE booklet. 'Electronics and YOU."
und tell me how I may prepare to enter one or more branches
of Electronics.

Nome	Apr -
Street	Apt
Chy 20	ne State
Check hore if subject to Military Te	
DeVey Tech's Connedion Training Co 2013 426 Resolvers Assesse, Toronto	

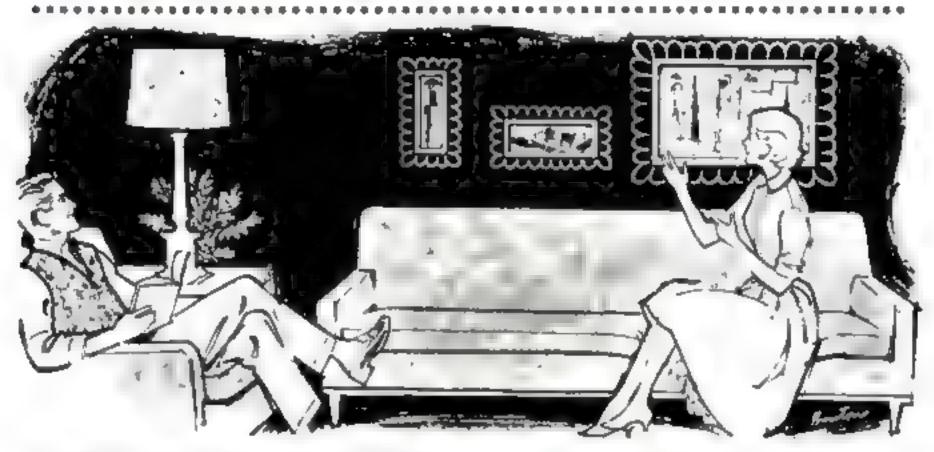
Keeping the Home Shipshape



KEEP A DOOR FROM SWINGING SHUT when you don't want it to. Remove one of the hinge pins and pound it lightly to bend it a bit. When replaced, it will hold the door in any position.



YOU CAN MAKE A DUSTPAN EACK from two wooden clothespins sawed in two as shown. Drill the stepped pieces to take a screw and brad, and mount them on a closet wall or door.

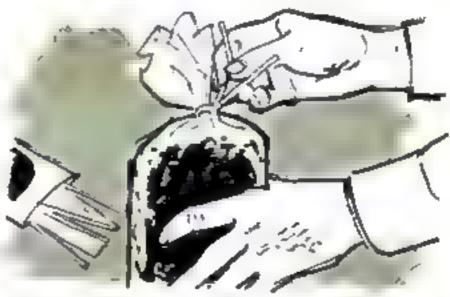


TO MAKE A SMALL FRAME LOOK BIG, tack loops of stiff twine all around its edge at the rear. Then

cover both the frame and twine with white paint, and fleck with gold accents.



PROTECT TILE PLOORS from being marred by the sharp bottom rim of a scrub pail. Four pieces of slit tubing attached to the protruding edge with rubber gasket coment will cushion it.



TO SEAL A PLASTIC SAG full of dry cereal or potato chips tightly, twist a pipe cleaner around its neck. The cleaner is easy to remove and can be re-used many times for resealing the bag.

Here's the BEST DEAL YET.

for the man who needs a BETTER JOB-MORE MONEY

E. C. AMDERSON President

BIG KITS

AIR CONDITIONER REFRIGERATOR

FREEZER or

MILK COOLER

If you're just "breaking even",... if you're "in the hole" every month..., if your wife wants to look for work--you need more maney, a better job! You can have a good job with top pay and security in the old, established, but fast-growing Air Conditioning and Refrigeration industry. This field needs 20,000 newly-trained mechanics every year. It needs ambitious men to open service shops, It needs you! Don't say you're no mechanic! We know that, We also know we can train you at home to become a skilled mechanic. CTI has a real good deal for you. Just fill in and mail coupon and we'll rush full details.

AIR CONDITIONING

by practicing at home with real equipment!

YOU GET "FIELD EXPERIENCE" AS YOU TRAIN

You train at home in space time. CTI sends you 23 big kits of parts and tools. You assemble a commercial-type, heavy-duty, 1/4 h.p. refrigeration high-side (illustrated at right.) Then you build an air conditioner, refrigerator freezer or milk cooler. All equipment included with training? No extra cost.



In another kit (right) you

get matar, fan, pulley,

service tools. Kits develop

skill, let you get experience, climinate years of

low-pay apprenticeship.

You Get Kits Like These

At left is photo of tools included in just one kit. You get other tools, tubing, much equipment. Kits are sent on a planned schedule so that you learn is easy stages. You learn fast, tool



Add to Your Income by Earning Cash as You Train

He other training like it! You work on 10 trouble-shooting and repair projects

CTI training is practical, just like working on actual jobs. Like other students, you'll want to do repair work for profit noon after starting. Many students pay their tuition this way add to their incomes, even get started in a business. Get the facts about this. Mail courpors.

COMMERCIAL TRADES INSTITUTE - 1400 Greenloof Ave. - Chicago 26, Illinois

YOUR BIG CHANCE TO OPEN A SERVICE SHOP

Want to be independent—be your own bom? The air conditioning and refrigeration field is one of the best. It's big, uncrowded, packed with opportunity. Start small and grow big, Many



monthly fee busis—do repairing for shops, food stores, meat markets, etc. Others answer home calls. In time, they build up a customer list, open a shop. You could, too!

FIRST GET THE FACTS - THEN DECIDE

COMMERCIAL TRADES INSTITUTE 1406 GREENLEAF AVENUE DEPT. R-457 CHICAGO 26, RLINOIS Evir guruteen, and Sample Joseph Air Conditioning & Refreguration, and Sample Joseph PRES. Address: Sample Joseph PRES.

Prize Projects BY PS READERS







Mixed-Up Car. A two-hp. lawn-mower motor in the rear powers this little car that Alvis A. Lee of Prairie View, Tex., built for his daughters. Wheels and the driving mechanism came from an industrial mower. and the body is galvanized sheet iron over a wood frame. The only auto parts are a Crosley steering wheel and truck reflectors used as tail lamps. With the chassis, running gear and body constructed from backyard scrap, cost of the car was less than \$75.

Physe, has a two-pound lead weight under the seat to give it heft. John G. Lownsbery of Richmond, Va., made it of solid Honduras mahogany assembled with dowel joints. The strings of the lyre at the back are \(\frac{1}{4}\)" copper-coated welding rod, polished and lacquered. Blue velvet was used to upholster the seat of this ingenious and handy little job.

Desk and Chair. When farmer Arthur E. Ader of Rolfe, Iowa, sits down to his correspondence, he uses home-grown furniture. He built the desk and chair of solid walnut from trees cut on a neighbor's land. The job involved assembling and gluing 114 pieces of wood. The desk top is made up of three boards, doweled and glued. Ader also made his own shaper for edging the desk top.

Have you recently completed a workshop project of which you are particularly proud? Send a good photograph of your work, along with the negative and a brief description,

to the Mechanics and Hundirtust Editor, Poetura Science, 353 Fourth Are. New York 10, N. Y. We will pay \$15 for each item that is accepted for publication.



CROD TORS . . MONE MONEY SECURITY ALL CAN BE YOURS

VOL are needed in the great modern Tele sisten Hettropas, rales is a framed technictains are hig issing a mane at propilede pay, in tales and very ce in anulactoring, he a castery like asting, communications. research, and many other important branches of the field. Nacional Schools Master Shop-Method Training, with newly ad led levelor and emisphient prepares you in your spare me right in your own home for these favornating apportunities. OUR OUTSTAND-ING METHOD IS PROVED BY THE SUCCESS OF GRADUATES ALL OVER THE WORLD

TOUR TRAINING IS ALL MICLUSTVE

We prepare you for a long list of job opportunities. Thousands of TV and Radio receivers are being sold every day-more than ever before. And, now, Color TV is here, Applications of Electronics in industry - AUTOMATION - are growing in tremendany strades. The whole field is alive opening up new, important jobs rapidly National Schools complete training program qualifies you in all phases of the industry

YOU LAND WHILE YOU LEARN

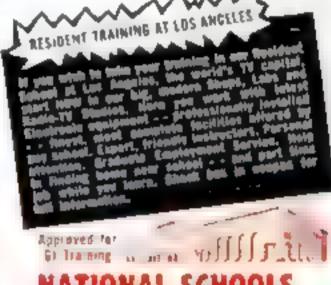
Many students pay for their entire training and more - with spara time earning. We'll show you have you can, too! Early to your course you receive material that shows you how to earn extra money servicing TV and Radio receivers, appliances, etc., for friends and acquaintances.

Clear professely illustrated lessons, shoptes el manuals mestro simuli d'agrans practical of process at the valuable equipment shown above many other mater als and services a multiple in privilege with our quantities staff and Gradiate his of some Service IN ERVINING YOU NIED for contraining success in Exectionics.

A 12 6 2 1 4 4 4 6 4 No u

YOU LEARN BY SHOP METHOD

con to servicing circuit analysis and doover 100 slown-to-earth experiments. You build a Superhet Receiver and a modern TV Receiver, from the ground up, including a new, but screen picture tube. You also rereive a professional, factory-made MULTI-TESTER. All of this standard equipment is yours to keep . . . At just one low button.

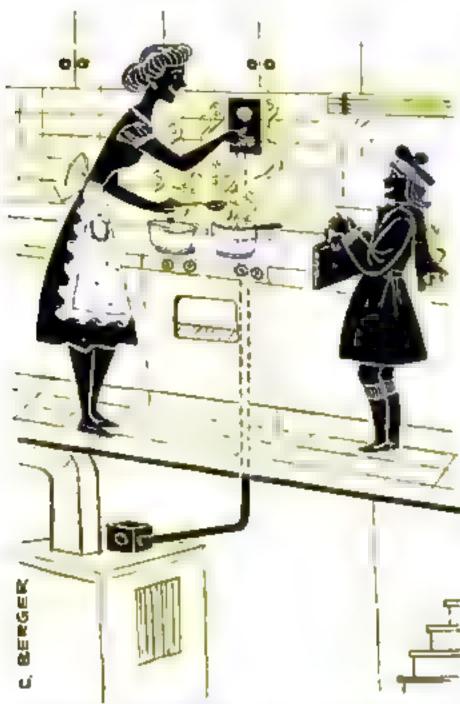


LOS ANGELIS JF, CALIF



HATIONAL SCHOOLS;	0
NATIONAL SCHOOLS, DEPT RG-28 A000 S PIGUEROA ST LOS ANGELES 37 CAUP Rush free TV-Radio "Opportunity" Book and sample lesson. No salesman will call.	
ACCUPATION	<i>[</i> (b)

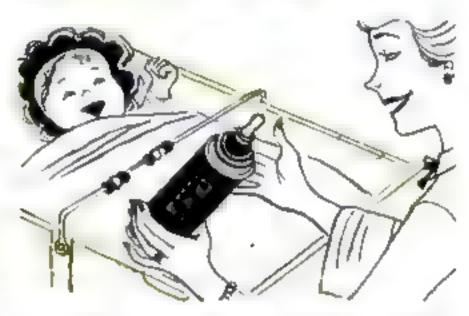
"I'd like to see them make



KITCHEN DEODORIZERS that could be linked by tubing to forced-air furnaces. They would quickly eliminate cooking odors in winter when windows are shut .- Fred Purnell, Lombord, Ill.



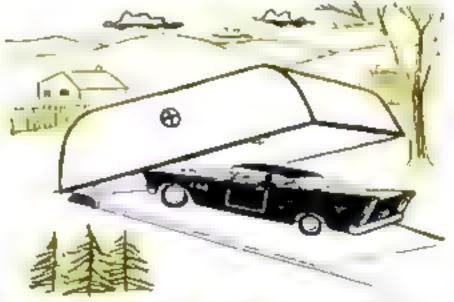
A JACK PLANE WITH AN EXTENSION at one side. By sliding the extension along the face of a board, you could keep the edge square while you planed it.—Donald Snyder, Canton, Ohio.



A VACUUM-BOTTLE ADAPTER to make it a buby's bottle for use at drive-in movies or on ear trips. No need to heat the milk-just slip on the nipple.—S. Abramczyk, Wyandotte, Mich.



PULL-OUT DOME LIGHTS on cars. A long reelwound cord would allow the lamp and housing to be removed for use as a trouble light outside the car.-Robert Current, Fort Wayne, Ind.



A ONE-PIECE PLASTIC GARAGE that would swing open or closed, like a clamshell, on a spring-andhinge mechanism anchored in the concrete-slab base. - Ralph Westervelt, Newark, N. J.

Eretyone has his non pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were auggested by Popular Science readers. What's

sauce? We will pay \$5 for each one published. Please me-Congruences postcards only Write name and address clearly. Contributions cannot be acknowledged at returned.



Young men and Older men prepare for OPPORTUNITIES IN ELECTRICITY-ELECTRONICS

Whether 17 or up to 45 years of age, don't be entirfied with a "no future job." Train the Coyne way for a better job in Electricity-Electronics-a field that offers a world of opportunities now and in the years ahead. In industry—in the home— Electricity and Electronics are playing a vastly greater role than ever before. New developments and fabulous growth are creating increasing job opportunities.

YOU TRAIN IN CHICAGO

Learn the easier practical way in shops of Coyne in Chicago, Shop work plus technical training No advanced education or previous experience needed. Lifetime Employment Service to Coyne Graduates, Frequent starting dates.

START NOW-PAY LATER

New liberaltsed credit terms and Finance Plans. Part-time employment service to students. Help in making housing arrangements.

VETERANS OR MON-VETERANS

Coyne training is offered to Veterans and Non-Veterans slike. We lisend Bulletin giving full information. Send coupon for details.

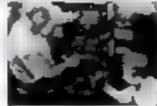
Training in Refrigoration and Electric Appliances can be included.



1. You are lold the how and why of each job.



2. You're shown how to do it by trained instructors.



3 You do the jobs yo an finaci agripment,

B. W. COOKE M., Prod.

A Yechnica) Trade Institute Operated Not For Profit 500 S. Pauline Street, Chicago, Dept. 38-4E ELECTRICITY + RADIO + TELEVISION + REFRIGERATION + GLECTBORIGO

C he liming a program Timbe a qui Hame of the for the new wealth of experience. Coyne Electrical School

INDUSTRIAL ELECTRONICS - one of the more recent applications of Industrial Electronics to manufacturing processes - promises to create additional demands for trained Electrical-Electronics goon such as we have never seen.

Mail compon for big free book!

48 Page Histirated Book, "Guide to Corvers" ares you all the facts, answers your operations about Electricity-Einstronics and describes all

All information will came by return mail. No abligation and no saleson will call, so send coupes sow !



Cover Electrical School, Best. 25-48 500 S. Paulina St., Chicago 12, III.

C. . . DIO EDDE DOOM . L. . . . Physician

Electronics and details of all training you offer,
Name
Address
City State



IN TOWN TRAFFIC . . . some spark pluge, designed for high eposes, become fouled and cause missiring and lose of power when driven at low speeds.

to the second . . . some epark pluge, designed for tote aposts, minfre causing power loss and invite destructive preignition when driven at high speads. Why pomble when . . .

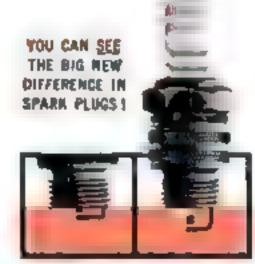
Auto-Lite Resistor Spark Plugs with POWER TIP "Fire Up" your engine* at all speeds!



If you drive at both town-traffic and highway speeds, here's why you should use Power Tip ... the first spark plug ignition-engineered for today's engines and today's driving.

At low speeds, the projecting Power Tip is in the thick of combustion where it gets hot quicker and stays hot to burn fouling deposits away clean. At higher speeds, the projecting tip is in the path of the incoming air-fuel mixture where it stays cool to check power-robbing pre-ignition. Ask your garage or service station to install Auto-Lite . . . the only spark plugs with Power Tip . . and start enjoying top performance and economy from your car at all speeds.

*Power Tip, with or without Resistor, is ignition-engineered for overhead-valve V-S engines and for most overhead-valve 6-cylinder engines in all those cars—Buick, Caddlac, Chevrolet, Chrysler, De Soto, Dodge, Edsel, Ford, Hudson, Imperial, Lancoln, Mercury, Oldsmobile, Nash, Packard, Plymouth, Pontiac, Rambler, Studebaker.



Ordinary Tip

Power Tip

Power Tip protrudes farther into the combustion chamber for better ignition. Fuel hurns more evenly and completely to give top performance and economy at all speeds.

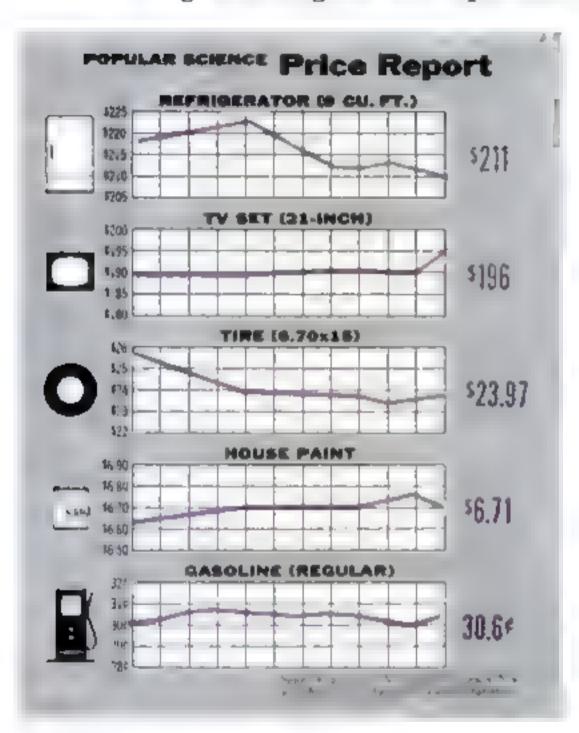
AUTO-LITE POWER TIP

Auto-Life makes a complete time of spark plugs, including Standard, Resistor, Small-Engine, Transport, Aircraft, and Diesel-Starting.

You ought to know...

Solid price information—at last. Every month in this space PS will report on actual retail prices—the data, never before available, you need for smart shopping.

How much should you pay for a TV set . . . tires . . . paint . . . refrigerator . . . gasoline? List price doesn't mean much. Adver-



tised price is often bait. To get the most for your money you want to know the going market price—what buyers are actually paying.

That's what the Popular Science Price Report will tell you. It's a PS exclusive. No other publication has ever done it.

The figures are average retail selling prices, collected every month in the five largest U.S. cities (New York, Chicago, Los Angeles, Detroit, Philadelphia) by a corps of professional shoppers. They're accurate. The gas prices are supplied by the staff of "National Petroleum News," a Mc-Graw-Hill trade journal. The other four come from the Bu-

rean of Labor Statistics, the Government agency that compiles hundreds of prices to compute the official Consumer Price Index (the figure used to adjust wages of some 3,000,000 workers). All PR prices include federal taxes, but not local sales taxes.

Which commodities? They're the ones you want to know about:

- Cas-regular grade.
- Paint-first-quality, exterior white (not trim), one-gallon lots.
- ► Tires—tube-type 6.70 x 15, four-ply, standard grade. Mounting charge is included, trade-in on old tire deducted.
- ► TV sets-21-inch standard table models using 15 to 18 tubes.
- ▶ Refrigerator-8.8 to 9.7 cubic feet; across-the-top freezer chest.

How to use the Price Report: Remember, these figures are aver-

You ought to know...

ages. Some stores charge more, others less. Consider the PR quotation as a starting point. You shouldn't have to pay much above it; you'll do still better by shrewd shopping.

Watch the trends. Each month we'll show a whole year's prices, month by month. If the curve is climbing but you're going to need to buy soon, buy now. If it leans downhill and the purchase is postponable, wait a while. We'll give you tips on this point, so that you can plan ahead (the Price Report quotes latest available figures, which necessarily are some weeks dated).

Watch the seasons. Tires, gas, paint run higher in spring and summer. Appliances jump right after new models come in (look what happened to TV sets last fall). The curve highlights seasonal quirks. We'll call your attention to them, forecast changes.

Know your area. The Price Report is a national average, representative of the whole U.S.A. But localities may differ. Detroit is high on gas (1¢), tires (81), TV (815). Chicago is high on paint (12¢), refrigerators (\$16). We'll keep you posted on this, too.

Right now, watch these prices:

- Lumber could swing up. Housing starts have been down, so you can get good buys in two-by-fours, planks, boards, sheathing plywood (see Jan., p. 21). But residential building jumped 11 percent in October (over October, 1956). The bargains may fade.
- ▶ 1958 appliances all carried higher price tags. And now Hotpoint predicts another price hike early this year.
- ► Hard-surface floor and wall coverings are scheduled to go up as much as five percent.

How dangerous are toose auto nuts? Startling evidence shows that they—the mechanical fasteners, not the drivers in cars—are a major source of highway accidents. It comes from a survey of over 500 state inspection-station examiners conducted by New Jersey's Division of Motor Vehicles.

The division wanted to find out when so-called mechanical failures are really fastener failures. There are around 800 mated parts on an average auto. Most of the joints use some kind of lock washer to counteract strain and vibration.

Is a shaky fastener very dangerous? Nearly all the New Jersey examiners said "Yes!" After thumbing through their records, they came up with a total of 1,262 smash-ups caused by lost fasteners. No one part of a car was more dangerous than the others. Fastener failures in brakes, wheels, steering controls, drive shafts, axles and other parts all contribute to accidents. Danger spot: generally speaking, any place in a car where a lock washer is used to hold a nut and bolt together.

The American Association of Motor Vehicle Administrators has urged Detroit to give the problem serious consideration.

Title regimered, contents copyrighted

Charles M. Garney

This Practical Self-Study Course will give you

COMPLETE MASTERY OF ATHEM EASILY, QUICKLY

Learn Mathematics...get a BETTER JOB!

ow you, too, can learn mathematica and get the basic training for a betthe kind of training that in kly recognized today and gladly ___ f for

Just look at the "help wanted" ails in a bug time newspaper slook at the hun- Is al womserful apportunities for men know mathematics superintendents. foremen technorians and laboratory w kers designers draftsmen, mathemaas and engageers. Look at the hoge pances - page after page of them it a are advertising for help every day in weer! They all need trained men, men

who know mathematics, to help them keep up with the ever increasing demands. in aviation, electronics, nuclear sesence, automation jets and miss les.

Now you can learn mathematics-the (mandation of all technical work-quickly early mexpensively and right in your own home. A very sample and interesting course in book form has been prepared for you let all expert who has devoted a lifetime to feathing practical men the fundamentals of this important subject. every manufe you spend on this complete practical course in mathematics will pay you big dividends.

MATHEMATICS For Self Study

By J. E. Thompson, & S. In E.E., A. M., Dogt. of Mathematics, Fratt Institute A COMPLETE COURSE AND REFERENCE LIBRARY

wart right from the beginning with a review of arithcountries hours or one. Then, seep by step you to higher mathematics and learn how simple it as can ser an expert explains it to you

Get This Training in Only Ten Minutes a Day

can gain all the benefits of a mathematical training ina low months if you will devote only ten minutes each to these casy practical icisions.

Here are but a few of the bundrods of subjects simplified and explained in this complete solf-study course in methamolics:

An Export Wvez You Mis Simplified Methods

Prof. Thompson, the author of these hooks, it an expert at teaching practical Mathematics. ble presents each problem in he clea est somplest way He gives you the kind of information you need for auccess!

ARITHMETIC Starting with a spick review to spice this book a ter fourth special to make on methods used in business and in the man methods used in business and in a that p that prey practice, man should be just the state of the properties, the tan should and decimals the conductor of the properties, etc. I windown as a state of conductor of the properties of the conductor of the co

Attenda This volume makes alrebra a live of eventular subject. The author starts with a mple problems that can be policed by actifimatic and then shows you have in apply algebraic methods. Among other subjects if teaches you ail about logarithms—the method of computa ion that engineers use to save time it also shows you have a soire problems which are insolved to business and indus-VOLUMES

CHOMETRY This book gives rod the practice rummon-sense me had for solving all problems in both mane and sould scotte fy problems in the geometry of subsections have apply a four raising all the way from the stopp to be earth torif

TREGORDAGTRY Practically every problem in machine work land surveying mechanical as romany and harigation is joived by mechanical of traponomic by and this intereasing solume makes he methods as solving here clear and easy. These me hoos are end sined a maps with ac use examines of talculations of health and distance as most ed o meteorology the post on of a ship at sea the construction of buildings bridges and dams, the culture of grare sign

CALCULUS. This branch of mathematics to save time it also shows you desire in fate problems and in essential in computation involving objects may be save problems which are involved to but ness and industrial turk relating in machines. In find the most efficient design for any kind the most relating to the find the most efficient design for any kind of mechanism engine or moving vehicle.

YAN NOSTRAND COMPANY, INC., PUBLISHERS, PHINCETON, NEW JERSEY

Thousands of John Are Watting for Trolond Mee

de, Marie man-

iti, mere provinci Shoo avar balaval

TheCALUTS

GEOMETRY

NDUSTRY if working at top caposity to exect the needs of our greature endentrial program. Trasped mechanics and techniquens are in orcent demand, and in practically ALL OF THESE JOBS a knowledge of mathematics is required.

Remember mathematics is the lowdation of all technical work. Give prograd(this basic preparation now by the quick, convenient, meapengive method.

SEND NO MONEY

41

Sand no money now, not a penny! The coupon at right will bring you the complete course in book form for 10 | days free trial Unless you are consinced that this course is exactly what I you need and want you may return 1 the books and owe nothing or you may keep them by sending us the small down payment of \$1.85 balance in four monthly payments of \$2.00 each. Take advantage of this opporfunity. Mail the coupon NOW!

	 Citizen with the same of the	AND RESIDENCE	1 -
THE AL	T-101-1-1	COUPOR	_
47		THE RESERVE AND A SECOND	-

P6-2-58 B. You Hust-and Company, Inc. 120 Alexander Street, Princeton, New Jersey Send me MATHEMATICS FOR SELF 4TI DY in a columna. thin 10 days I will either veture the books or send you \$. 85 m first payment and \$2 bit per month for four months until the fold price of \$2.50, plan small delivery cost in part.

(fr you send to 1) with this common are will gon the de-liberty cost. Some ceture privilege return poseunted 2

Nume.			
Address			
City	Zute	State	

In Canada: Order From D. Van Hestrand Company Ltd. 25 Hellinger Road, Toronto, Canada

Check the Kind of Body YOU Want: | Slimmer Waist, Hips.



You Can HAVE It!

JUST tell me, in coupon below, the kind of body you want and I li give it to you SO FAST your friends will be amazed I'll show you how you can become a NEW MAN in just 16 minutes a day—in your own home—or it won't cost you a penny!

You wouldn't believe it, but I myself used to be a 97-lb. weaking. Fellows eniled me Skinny Girls made fun of nie THEN I discovered my marvelous new muscle-building system—"Dynamic Tension." It turned nie into such a specimen of MANHOOD that today I hold the title THE WORLD S MOST PERFECTLY DEVELOPED MAN"

DYNAMIC TENSION—that's my secret' When you look in the mirror and see a healthy, husky fellow smiling back at you then you'll realize how fast "Dynamic Tension" (ETS RESULTS That a because it's the natural method you can pract or in your own room—JUST 15 MINUTES A DAY—while your chest and shoulder muscles begin to swell,... those arms and legs of yours bulge,... and your whole body starts to feel "alive"—full of sip and go—INSIDE and OUT"



FREE Illustrated 32-Page Book

Send NOW for my famous book showing how "Dynamic Tension" can make you a new man, 32 pages, parked with photos, valuable advice answers to vital questions. I'll send

FREE if you rush cou pon to me personally

Charles Atlas, Dept. 12, 133 E. 23rd St., New York 10, N.Y.



CHARLES ATLAS, Dept. 12, 115 East 23rd St., New York 10, N. Y

Dear Charles Atlas-Here's the Kind of Body I Want!

O St moor Waist Flags C Note Pro Hennier Chest Sheuters C More Pt C More Weight So Id C Beuer E

More Powerful Army More Powerful Legs Deuer Energy

Spend one absentancely Fight. a rooty of your famous book showing to we depend of Tons or can make me a new man 22 posters of a toured with photographs abswers to vital questions, and valuable grivice. No obligation

Name

(Please print or write plainty)

Address

Addres

State

24 POPULAR SCIENCE



Alorm PLUS Sure-Fire "Ne-Selling" Plan Offers

Ambilious Men Huge Frofit Opportunities

神水红

DEMONSTRATION

Sensitive Lighted match triggers Alarm

in I seconds

Even beginners cleaning up unbelievable profits with first practical, effective, low priced Pirs Alarm Reeded in homes, factories, offices, stores on farms, etc. Meritz Pira Alarm hangs on wall like a picture — no wiring to hastallation it a aways on guard amelia fire before danger point. When temperature rises Pire Alarm goes off automatically how a food warting that can be heard it 6 mile wakes up soundest sleeper gives precious time to put out fire, call fire department or escape Sells for only \$4.95, with profit up to \$2.70 off each one

Hourest Thing to Automation Sailing

with our field-tested plan tustomers sell themselves. No cold canvasing no hard selling it is the
nearest thing to "Automation Selling" Even a
child can use plan successfully with powerful
successfully with p

PREE SALES KIT

Send to money Just rush your pame and address for all the exciting money-making facts, complete lituatrated Sa es Kit everything you need to make money first day Learn how se and only 20 Pare Alarms a day brings you \$, 080 00 a month. No competition, Rush your name and address today

MERLITÉ INDUSTRIES, INC. (Alorm Div.)
114 E. 32nd St., Dept. S-16F New York 16, N. Y.
IN CANADA: Mopo Co., Ltd., 371 Dewd St., Montreel 1, P. Q.

ENGINEERING Home Study Courses

COURSES written by world authorities in all branches of engineering. Step-by-step instructions using methods proved successful by thousands of our graduates, One hour each day in your spare time will start you off to higher pay, security, presuge. Check the course you are interested in and we will send you a complete outline of the course with a booklet. describing the Institute and our advanced methods of teaching. Send to: Canadian Institute of Science and Technology Ltd., 680 Century Bldg., 412, 5th St. N W Wash., D.C.

Civil Eng. **Surveying** Architecture Forestry M ning Structural Mechan cat Eng. Industrial Eng. & Management Refrigeration Heating Drafting Plastics. Electrical Eng. Radio E octronica Television AeronauticalEng. Aircraft Engineer Nav-gation General Education Chemical Mathematics Journalism Accounting

NAME	 4 .44.464444
ADDRESS.	***************************************
CITY	STATE
Course Interested In Canadians: Send to Canadian Institute of Science & Technology Limited, 680 Garden Bidg., 263 Adelaide St. West, Toronto, Ontario.	

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

82-B DISTRICT NATIONAL BUILDING WASHINGTON 5, D.C.





Complete sal of pendagsional lasts and alt-Metal feet her. Some top-quality equipment used by angert machanton everywhere. Use them, display them prendly



"Motor Analysing Cocentern Standard Cogine Vocuum Fact Fump Factor. Remote Starter Switch, Medden Finding Light, Standard Comprescion Tester Play compect correlors uses & motrections.



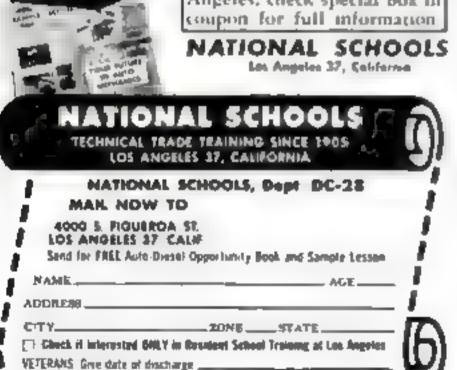
Top quality Suchet Wrangh with Fittings Beel professional tools you'll use dering your infetime career in repair ing oil types of ongenes, from foreign care to big dieset jobs.

"I've worked alongside National Schools-trained mechanics," reports Sam Hanks. "They're tops, because they get all-around training, and they know how to repair fast and right the first time. No wonder National Schools graduates command top pay."

Earn as you learn men! We'll show you how. Streamlined lessons, diagrams, manuals, latest equipment, practical methods prepare you for hundreds of jobs in scores of industries. Free Placement Assistance.



If you wish to take your Auto-Diesel training in our famous Resident School at Las Angeles, check special box in coupon for full information







GARCELON STAMP CO., Dept. 2 PSW
Calais, Maine. Rush FREE World-Wide Stamps, Callector's Gulde, other offers. Enclosed 10c for postage, handling. (PLEASE PRINT)

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS - COPYRIGHTS - PATENTS
142-H VICTOR BUILDING, WASHINGTON 1, D. C.

EARN WHILE YOU LEARN

my new, faster way!



Educational

Or estar

Let me prave to you . . . without cest or obligation ... that I can prepare you to be a Radio-Television Servicemen in 10 Months or Less

Let the true facts speak for themselves! That's why I want you to have my big new catalog and an actual sample lesson of Sprayberry Training-both FREE! READ - then make up your own mind! Train at home in spare hours for the best jobs and the biggest pay in Radio-Television. Easy payment terms suited to your budget, I will help you earn extra money doing radio service jobs while you learn?



Cat Practical Experience with 25 Kits of Radio-TV Parts

Practical experience counts most. In addition to modern lessons, you train with actual parts and equipment. Build the famous Sprayberry Training Television Set, Multi-Runge Tester, 2-Band Radio, other Test Equipment-all yours to

an Color TV, Transistors, Hi-Fr and UHF Conversions ... jucluded to make your training more valuable.

You owe it to yourself to get Mail coupon for all the facts catalog and sample lesson - FREE

See for yourself . . . in actual pictures and descriptions . . , why Sprayberry Radio-Television Training offers more. Backed by almost 25 years of training experience. Three training plans to suit your exact needs. Rush coupon coday for big new catalog and sample lemon. No of ligation; no salesmen will call.



SPRAYBERRY ACADEMY OF RADIO-TY 1512 Jarvis Ave., Dept. 95-0, Chicago 26, III.

Mail Coupon Today!

SPRAYDERHT ACADEMY OF HADIO-YELEWISION Mille Marin Ann., Bugt. 55-8 Chicago 26, III.

Please rush catalog on your ALL-NEW Radio-Television Training Plans. I undertond this does not obligate me and that no pelasmon will call. Include Somole Lesson FREE

Nome	Agt	
Address		
City	Zone Stote	

Our Best Value of the Year!

AMP. RUGGED 1/4" THOR **SPEEDRILI**

If your work calls \$1495

for a content dried \$1495

with FOW ER to

SPARE motel on a pleas soc

\$24 Armp tob

and flusher earse it a helig

There? No fine drift pand,

mane! Solad size brait vented

he wall greate throat taken on

hardened sizel faul and plate

reare permanent 5 parked and

ora rd in TIFFTIMF greate

Neith trigger and toch masenbly atmapsines locking and re

lease (finter Yuts if he wise to

larg 2 at this price



lease trieger You illing 2 at this price

Surgical Steel Hand Ground

Set of 12 CARVING KNIVES I

The sharpest, beenest grand conficel afect blades we have ever even sharp change to spell a harden but in the 12 different shapes and odges can do every job of bowdes in a grant state and obtains and obtains a long hardwood handle for easy gripping break the harde for easy gripping break different gitarbed by constant a brace forms; to whate long state is needly district by minute of a brace ferror to enterte loan realizated representations. Each our girel steel brace presentation black ground to easily and match political and entertial and

Prices SLASHED 50 % on Polyothylene PLASTIC ROLLS!

Use As STORM WINDOWS-Dust, Moisture-Proof Protections



* STAPLE IT HEAT SEAL IT,

Protects from dust diet, moisture run moths heat cold etc Transparent Stains w.pc of Pikpine Spi ercoul (Benbatterag

Waterproof, Resistant to Doct, Air, Green-Uneffected by Heat, Cold.

For MOME-Curer auto acats. furniture mai retter attors, rues appliances luggare siver to provent larm she ar condution to provent larm she at condution storm windows Keep paint off furniture floors, etc. Wrap food mouthproof wrap clothes

For OutDOORS—Cover boats, sports and fishing equipment tentis courts, rare. Make children's play tents

For SABDENS-Protect outdoor furni are and equipment should rights, newly seeded deems its d greenhouses. Cover lawn

For industry—Cover equipment and mach new Fundah.

In, owhen tehts Pa er a drap goth Floor covers for car transfer tracks theses we store your from craw! spaces store turing er screets Rem rain away from outdoor work areas

36'4100 ft. 004 gauge \$4.98 64'x100 M. 001 gauge 10 98 64"x100 ft. 004 gauge 18.98 120'a100 ft. ,001 gauge 22.00

EXTRA SPECIAL

30"x200 ft. 602 gauge \$6.95 100"x200 ft. 603 pauge 19.95 120"x100 ft. 806 gauge 29.95 Add SGc on. How for pp. & bdlg,

OUR PRICE \$2.00 ppd. | Add SOC on from for pp. & bolls, SCOTT-MITCHELL HOUSE, INC. Dell' C-3 611 Breedway

INVESTIGATO

EVERY COMMUNITY

Every second of every

day accidents and losses!

THE ADDRESS

Wa'll Train TOU for a LIFE OF EXCITEgrowing billion-deller Claim Adjortment Field.

MYESTIDATE







WINDSTERN COLUM





happen - and trained claim adjusters are needed to investigate and to distribute billions of dollars.

Yes, thousands of insurance companies, airlines, railroad companies, steamship lines, and Government Offices must continually use Claum Investigators and Adjusters. Trained Claim Agents are ofcopy in demand. Many earn over \$750 a month.

Here is your opportunity. At home in spare time you can learn this fascinating work - easily, quickly

In taking our Adjuster Training Course you are given the necessary knowledge either to enter your own husiness or to work with one of the

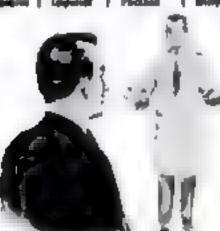


men tans toopen learn	TOU THE PERM
UNIVERSAL SCHOOLS, Dept. PS 2	
University Park, Box 8202, Dalla	s 6, Texas
Please rush me your free book on	Claim Investigation.
This does not obligate me and no	nalesman will call,
Home .	Age
Address.	

COVERS ALL THESE MAKES ... ALL MODELS, 1949 THRU 1958

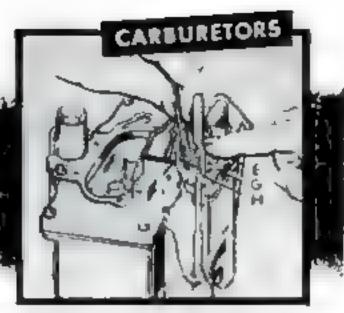
Soldi Codillos Charación Clippo By Line Bridge School Ford Bridge Especial

Linesto Electrony Back Officerat Portant Piperrit Pending Smaller Smaller Streetstine Elitys





Clear photos, extensy fravings and diagrams, plus know-how givertions make every gart of any liquides quies exystel-door.



the more guaranteelt. You got Ulantraled, stop-by-

Let Factory Experts Show You HOW TO FIX ANY PART OF ANY CAR

AVER
214 INCLINION
CRIPIES SOLDY
USED BY
USE APPICE
FORCES

This Famous "Auto Repair Bible" Turns <u>Beginner Mechanics</u> into Experts—Saves Experts Time, Trouble, Money

SUPPOSE crews of trained factors experts
Sweet ready to guide your hands as you start to its any part of any car If they told
you EXACTLY WHAT TO DO, couldn't you
wrap up any repair job—quickly easily
right? That a exectly the kind of expert guidable you get in MOTOR 6 new AUTO REPAIR
MANUAL!

TOU CAN'T GO WEONG!

With clear illustrations and step-by-step instructions these experts show you how to breeze through any job on any car insted - 1949 thru 1958. Even if you're a beginner, this famous Manual can show you how to fix cars the way the EXPERTS do Tells you with the way the EXPERTS do Tells you with the way the EXPERTS of the way you svery STEP of the way.

Tou get practical how to-do-it proced see worked out by AUTOMOTIVE ENGINEERS- from 176 official Shop Manuala hundreds of factory bulleting, boiled down in
timpis, easy to-follow language Over ONE
THOUSAND giant pages, 2,800 This-is-Row
pictures. 291 Quick Check Charts 23 436
secential repair specifications Over 233,600
service and repair facts, instructions and pictures are so clear you can't go wrong

3 900KS MI 1

You actually get three complete "showhow" books in one glant bondy, indexed 1. Complete THOURLE-SHOOTER SECTION apota more than 2 330 car troubles helps you and the bugs fast

2 NOW TO SERVICE, REPAIR ALL CAR PARTS— Transmissions Air Suspension Symmetry Rear Ends Generators and Regulators. Puel Pumps Ignition Systems Overdrives. Automatic Transmissions Brakes, Rings, Water Pumps Distributors Dash Gauges, Power Streeting, Puwer Brakes, etc., etc.

 STEP-BY-STEP INSTRUCTIONS AND PICTURES on each specific for make and model -covers over 800 car models---1948 thru 1956.

PLUB Pactory Specifications and Adjustment Tables, Tune-up Courts, Overhauling and Replacement facts and MUCH MORE! Used by Armed Futors, hundreds of thousends of auto service men

TRY BOOK FREE 7 DAYS

Bend no money! Just mail couput (paste it to a postal card if you prefer) Use Manual for a week /ee t aless you agree that it is rise greatest time and money-sever you we ever seen, return it is T days—and you won't owe a cent Mail roupon today? Address MOIOS Seek Dept., Book 20. 250 West 51ch to., New York 18. M. V (SCHOOLS, BOOK-STORES Write for discounts

MAIL COUPON NOW FOR 7-DAY FREE TRIAL (Attach to postcord if more convenient)

MOTOR SOOK DEFT

Book 20. 250 W. 53th St., New York 19, St. Y.

Bush to not at more taken buy symmetr book you man!)

MOTOR'S thew AUTO REPAIR MANUAL 11 O K. I w. remit

17 bs 7 days. BE monthly for 1 months and n dupl paymen, of 51 85 (plus 190 delivery charges) one month at r that Other-wise I will return the book pealpaid in 7 days trowing price, result 110 cmA with order ?

motor's New TRUCK REPAIR MANUAL, 12 OK I will result to in 7 days, and \$2 monthly for 3 months, plus 350 decire y charges with time payment. Otherwise | will request took pulled in 1 days. "Foreign price result are cash with switch pulled."

Clor______

Creech has mad seem like whiteping the do by the product Will compared for the surveing will be passed for the for Angle Report Manager. House 7 day getters retired privilege the Search Report Manager. House 7 day getters retired privilege.

Some FREE 7-Day Offer on MOTOR'S Armed-New FRUCE REPAIR MANUAL

Covers EVERY job on EVERY penaltorpowered truck mode since .DUE-FLUE CAR a m d C w to think



and Commission Dissells Over 2.000 (Dustrations over 304 886 facts Charle proper hos in responsion FREZ 7-DAT



Arranged Solf and Priends—
"I amazed appelf and mp
friends, ton New do jobe that
statistical me tations: Michael
Hallenty, Newark, M. J.

Autora and Pay Math |8 1847 Balighted

So Complete and Gary to Understand — "No samplete, east to understand—have done jute with Manna! I would get have nitempted without it."— C. L. Vancestrom, Mich.



2 YEARS OF STUDY can give you these ADVANTAGES:

- Associate in Applied Science degree
- Preparation for a career as an engineering technicism in

ELECTRONICS ELECTRICAL POWER METALLURGY COMPUTERS AIR CONDITIONING

 or you can continue without loss of credit to a 4-year Bachelor of Science degree in Mechanical or Electrical Engineering





FREE folder answers your questions about the Engineering Technician. who he is, what he does, and how to become one.

SEND TODAY

MILWAUKEE SCHOOL OF ENGINEERING

1025 N. Milwaukee St., Dept #5-258 Milwaukee, Wisconsin. Prease send free tolder

- "The Engineering Technician.
- Booklet 'Your Career in Engineering." (please print)

I'm interested in

iname of course).

Name Age

Address

Zone State Eligible for vets, educational benefits 📑 yes 🔲 no.

Discharge date...

31 POPULAR SCIENCE



Make big profits on thousands of exotic imports. Na experience or investment in products needed. Famous world trader guides men and womenshows how to pocket profits in advance, how to start full or spare time home mail order business.

Open cash orders, take out the money, deduct your profits, then have the unporta shipped direst from abroad. NO STOCKS TO CARRY on new plan, no face to face selling. Or handle volume orders for wholesalers, gift or department stores, etc. Export opportunities also.

FREE SAMPLES—CONTACTS ABROAD

Following our plan you receive free, 5 imports - and membership in international Traders which provides you with monthly bulletine revealing foreign products with names and additional of oversom auppliers

HUGE UNCROWDED Kach your more Imports are offered in U. B. and anapped up by mail order and store buyers aliks. And the word

"imported" is like magic to the engineers who want now. rare, romantic and onusual gifts at hig savings. And there seems to be no end to this demand. Others using our plan are now importing at low foreign costs prodacts that sell here at handsome profits. Why not you? GET FULL DETAILS and itst of 152 imports showing amazing low foreign prices - ALL FREE! There's

no obligation whatever. No salesman wir call on you, Air mail reaches us over night. Write today.



THE MELLINGER CO. 1717 Westwood Blvd., Dept. P242 LOS ANGELES 24, CALIF.



ANOTHER OF INDUSTRY'S

MOST-WANTED MEN

Chemical Lab. Technician -wanted for vital, high-pay jobs in a variety of fleids. I.C.S. can help you qualifyquickly and at low cost.

SEE SPECIAL OPPORTUNITY CHECK-LIST -- PAGE 51

I'll Send You This Handsome SAMPLE CASE-FREE

-/ -			_
7 100			-
1 120			
J 10 10 10 10 10 10 10 10 10 10 10 10 10	_		
			ш.
			ш.
			ж.
100	_		20.
		1	1
		contr	beil
100	For you	to per	71-41
40		H BENNE	a r

and faltern Very Horr to Makin Up to \$30.00 in a Day

Mind evolution for this Free Talkering Successful and positive to bittle each office in the Successful and the Talker projects. From Selection, Talker projects, from Selection, Talker in the selection of little districts. a hier hing medians date treat officet Stone wearing our our name over are opere unlece, ATISFA TION CANASTRED.

SEND NO MINET Ju. fit out and ten Philopole - Whiles PIONEER TAILORING COMPANY, Dept. 1-1121

COMPRESS & LANDON RENEST	T - CRICAGO 7, ILLINO
PIONEER TAILORING CO Congress & Throop Sta., Chie	., Dept. U-1120
	to Micaschie Suff TO WEAR for it. Rush details and Sample ELY FREE.
нами.	
ADDRESS.	

If You Had Mailed This Coupon. LAST MONTH-You'd Be Playing Real Music TODAY!

IL S. SENGOL OF MUSIC Studie 152, Mary Washington, N. Y. I am interested in learning to play, particularly the inmembers thereted below Picase tend me your free flustrated
bookiet. How to Learn Music at Home, NO SALES. Could Collect Street Collect C E Pripe, Manageri, Rend Green D Pinter Secondary D Statement Secondary D Statement Secondary D Statement D S 7) Young Barje C. Photological C Madaun Efamoniany Marining Manager at Trans. Second in C Plube Do you have the outrement?, Practical Player Charge Sand Number of Start [] If under 10, check here for Booklet

BUT IT'S NOT TOO LATE TO JOIN THE THOUSANDS WHO HAVE TAUGHT THEMSELVES THIS QUICK, EASY, INEXPENSIVE WAY!

YES, IT'S TRUE! If you had answered our ad a few weeks ago, you'd be playing real music RIGHT NOW! And you'd be well on your way toward mastering your favorite musical instrument—even if you'd never known a single note before!

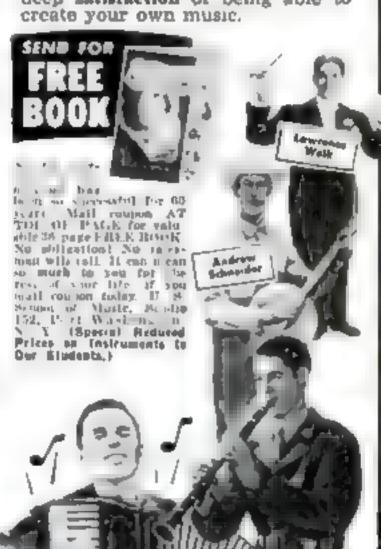
Impossible? Not at all! Over 900,-000 students have already taken up this famous home-study method-and even children "catch on" rapidly. Now ANYONE can learn to play the piane, violin, accordion, guitar, or any other instrument. And the cost is only a few cents per lesson, including valuable sheet music'

NO "SPECIAL TALENT" REQUIRED

No previous training needed, no "special talent" required. Right from the start, this amazing music discovery will have you playing real melodies instead of practicing boring scales and exercises. simple directions and show-how pictures tell you exactly what to do, so you can't go wrong. Soon you'll amaze your friends by playing your favorite songs easily, confidently, by note! No inconvenient lesson periods, no expensive hourly tuition. You learn in spare time of your own choosing.

STOP MISSING THESE JOYS

Why not let the U.S. School of Music method bring the many joys of music into your life? Good times! More confidence. New friends. Gay parties. Extra money from playing or teaching. Possibly even a brilliant musicul career. Best of all, the deep satisfaction of being able to create your own music.



Language Language Choose Your Favorite Instrument

Now it's easy to learn he note I' and tourier trouble on Violan Street Constant Mandon From 1 office! Navonlysne

Hapking

Tenar Ranto Organ I kulche Carinet Tenni hene Fute of Ficoto-heek your chofe in coupon at top of page

STUDBATS

MAIL COUPON NOW-PLAY NEXT MONTH

THOUSANDS NOW PLAY WHO REVER THOUGHT THEY



12-Year-010 Friends Priority of the party of the ke to pour tourse, I was

tauche, I was in play for our charett the friends were corthin y on here t below thy a secret was the manufacturer, Total Total

How Famous Orchestra
Leader Out His Start

I can my start in make
With a k of Nebrool toward
With many it is to tearn to
from our and ay an in
at the fine Leader wast
self may! - LawrenceWolk,
famous orchestra feader. (Picture at left)

Excell Friend Who Mas Tracher 111 never took ntarted to Journal



the the same and the began be vate for atmy sinc I dod with Stone.

"I lest want to tell you how much I can a pour less to how and how capild y I am progressing Treesing and et e. e.m. leg Lessons are et em ple any we can un terch d turn Andrew Schoolder. Hanna Wyomeng. (Festure at left)

"Opened Goor to Popularily"

I was able in play main
places in a short time
Course opened door or supularity wider circle of friends Peter H, Rozyrs, P D Brokentead Manifolia. (Picture at left)

New Invited Out Lots "It s been ian Hasn root anywhere n or as fideh as trivate teacher. Now invited to affaire dance." Howard Hopkins, E. Byracuse. N T. (Picture at left) an Hase root or as her. Now in-



Now Plays of Church
'I had tried
several thes
to sart thate
leasons 1 bad
been depending

before Now play at church etc. Mes. P. d. Taiman, Sycamore, Hillogis,

Inventors

If you consider your invention valuable, take these necessary preliminary steps promptly to protect it by applying for a United States patent.

> Sketch and describe your (For conveniinvention. ence in starting action on your invention, use "Evidence of Invention" form offered below.)

> Sign, date and have this invention disclosure witnessed by two people capable of understanding your invention.

> Have us make a preliminary search among U. S. patents already granted for similar types of invention. We then prepare a report for you on the probable patentability of your in-

> vention and recommend

your further course of

action.

This firm is registered to practice before the U. S. Patent Office. We are available to assist you in the preparation and prosecution of your application for patent.

We shall be glad to send you promptly and without obligation, an instructive beeklet-"Patent Protection for Inventors"—and our convenient "Evidence of Invention" form.

REGISTERED PATENT ATTORNEY 444-B MERLIN BUILDING, WASHINGTON 4, B. C.

37 POPULAR SCIENCE

PROTECT YOUR INVENTION "INVENTION RECORD" FORM AND "PATENT INFORMATION EVERY INVENTOR SHOULD HAVE".

REGISTERED PATENT

BLDG., 36th FLOOR, NEW YORK CITY



book of "Instructions on Patent Procedure for Inventors," also "Certificate of Invention" form sent without obligation.

C. A. SNOW & CO.

REGISTERED PATENT ATTORNEYS WASHINGTON 1, D. C. 426 SNOW BUILDING

Whether an invention is patentable can be substantially de-termined by a search of the U.S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

JOHN N. RANDOLPH

Registered Patent Attorney

205 Columbian Bullding

Washington 1, D. C.

BY IMPOSESTION

ENTOR'S RECORD without obligation

GUSTAVE MILLER SAPS WARNER BUILDING

WASHINGTON 4, D.C.

ATTORNEY

ABBOCIATE EXAMINES G.S. PAT. OFF, 1923-1936

Palant Alternay & Adyless N. S. NAVY DEPT. 1930-1847 PATENT LAWYER

INVENTIONS

if you want to market, or only, your invention for each or royalties, Write for our Pres Seatlet. Send he drawings. We also welcome bearing from firms, or private suplial, winning to review invantions in any field. We will be gied to send golles of our clients' inventions.

GLOBAL MARKETING SERVICE

2420 77th Ave.

Oakland S. Calif.





MANY FINISH IN 2 YEARS

No classes. No time wasted going to and from school. Progress as fast as your time and abilities permit. Standard H. S. texts supplied. Thousands enroll each year in this 61-year-old school. Send for FREE descriptive booklet.

AMERICAN SCHOOL, Dont. H246

Drexel at 58th St., Chicago 37, Ill.

Witnout obligation, please send PREE descriptive booklet,



You Need To Be A Qualified Auto Mechanic!

Start at once training this HOME SHOP way for the highest mechanics' wages in history! No matter what you are doing now, you can idera at home quickly, surely-qual-Ify for steady work, security and rapid advancement. You can make CASH money while training - and plan to open your own shop, be your own boss! Right now 30,000 meed. Get in on this booming field and prepare for a CA-

PROYE This America Training ON THE JOST

That's right! TEST the giant 6-volume McGraw-Hill Complete Auto Repair and Servicing Library which in-cludes the Home Course Outline We want to send you this made-to-auto-industry-specifications training so that you can see this Set in front of you - sample it - use it on a job-understand why ONLY a

STEP-BY-STEP INSTRUCTIONS TELL AND SHOW YOU HOW YO

· OVERHAUL BBY engine . BERVICE. MAINTAIN BUT unit . CHECK and DIAGNOSE any engine trouble TRACE troubles in lines. · CORRECT excess enaine wear conditions . INSTALL any new part or unit . ADJUST all moving parts, etc.

THOUSANDS OF FACTS?

master Bet of many volumes can give you the complete facts for repairing and servicing any part in any car!

Ne Langer Any GUESSWORK!

We want you to prove how the step-by-step instructions and "every-angle" photographs, drawings and diagrams make the most complex repair sear-quick-right the Arat time! See how you can tune engines, overhaul carburetors, service transmis-sions in all cars from 1926 right up to the present day with full confidence. See how each volume is like a specialist-ready to train and guide you to meet each car need including servicing all of the modern innovations. Make the secrets of experts your own: see how you will be in control of every situation. as If you had an engineer standing by your side to guide your entire training!

THE MASTER LIBRARY OF Surhanitile Madowhol

The McGraw-Hill Library is the work of William H. Crouse, noted author of practical auto repair books and at one time a Director of Field Service Education for a division of General Motors. He takes nothing for granted leaves no point uncovered. He has planned the Library for the man who wants to master auto mechanics-not just "tinker" at it . . . who wants to know the why as well as hom. BASIC reasons for all work are explained in clear

you work on neighpore' cars, toe make cosh money in

muse time!

FREE - HOME COURSE OUTLINE

A preven plan for making perio prochantes a lifetime CAREER! Tells how to not atseted and how to get about, As absolute must for the ambittors man who wants more than just a "job," Frupared by Wm. H. Crause. OUTLINE IS yours FREE!

terms. Your knowledge is checked every few pages with exciting Belf-Quizzes. You learn when to repair, how to service and the why of every job you'll ever do. Everything has been tested with thousands of beginners and engineers.

MAIL THE COUPON—WITHOUT MONEY—TODAY

Yes, we want you to use this giant 6-volume Library for to days and then make up your mind! Mail the coupon; when books arrive use them to guide you to the most complex repair you can think of Make them prove what we say. Then - in 10

days either return them and that will end the matter, or remit \$4.75 and \$5.00 each month thereafter until \$29.75 is paid ... an actual saving of \$9.30 on the regular list price of \$39.05. Don't miss out on this opportunity. Mail the coupon now!

FREE EXA	MINATE	BN COL	POM CA	VEC VOH	CO 20
FREE EAR	WILLIAM IN	DIS COS	L ALL SW	TED IVU	37.9U

FREE EXAMINATION COUPON SAVES YOU \$9.30
McGraw-Hill Book Co., Dept. P5-2 327 West 41st St., New York 34, N. Y. Send me for 19-day PREE trial the McGraw-Hill 6-vol. Complete Auto Repair and Servicing Library including Home Course Outline How To Get Ahead In the Automotive Business In 10 days 1 will remit \$4.75 and \$5.00 a month until \$25 % in paid—a \$9.30 saving on list price of \$39.05. Otherwise, I will return books postpaid, Check below to exam ne free for 10 days individual Crouse books from the Library Engines—\$7.00
Transmissions — \$6.35
For any single book I keep I will send \$3.00 plus delivery cost in 16 days. Balance of regular price one month later.
(Please Print)
Address
For price and terms outside the U. H., write McGraw-Hill Int'l., New York, N. T.

TESTED AND PROVED BY THOUSANDS OF TRAINEES

YOU CAN SUCCEED IN BUSINESS

THROUGH SPARE TIME HOME TRAINING

A better position—a higher salary—can be yours IF you can do the work. Business is always willing to pay the man who knowsand pay him well.

You don't have to be satisfied with a mediocre job at low pay when in your spare time at home you can quickly, and without interference with your present work, prepare for a brighter and happier future.

For nearly 50 years embitious men and women have turned to LaSalle for greater ability and larger success. So decide today to take the first step to better your own future.

Check the career of your choice in the coupon below and we'll send you by return mail, without obligation, full information on that field—the opportunities, and what you must know to be successful.

You can win Success if you train for Success.

Mail the Coupon Today

LASALLE EXTENSION UNIVERSITY A Correspondence Institution

417 So. Dearbarn St. Dept. 283R, Chicago 5, IR.

Please send me, without obligation, full information on the field I have checked below:

- ☐ LASALLE ACCOUNTING: Training for position as Accountant, Auditor, Controller, Cost Accountant, Public Accountant, etc.
- LAW: Training in Law as a foundation for business or professional success. Degree of LL.B.
- TRAFFIC & TRANSPORTATION: Training for position as Motor Truck or Industrial Traffic Manager, Railroad; Rate Expert, Freight Solicitor, etc.,
- ☐ CPA TRAINING: Advanced training in propuration for the Uniform CPA examination.
- BUSINESS MANAGEMENT: Training for Managerial, Sales and Department Executive positions,
- STENOTYPE: Training for position as Stenographer, Secretary or Executive Secretary using Stenotype Machine.
- STEMOGRAPHIC-SECRETARIAL: Training for position as Stenographer, Secretary or Executive Secretary using Gregg Shorthand System.

Name.	•	٠.				-		-	-	٠.	 	-	-	-	-	-	-	-	-	. 4	4,	ď		,	Ŧ	•			
Address						-	_	٠.						-				- 4		-	-	•	-	•			-	_	-
City, Zor	e e	á	ŀ	Si	ha	fee	ı.																						



SPANISH Europeon ITALIAN • JAPANESE MODERN GREEK ICELANDIC

Any of 34 languages available at home

Owls LINGUAPHONE The World a Standard Conversational Method, to ngs # to 12 of the word's best parive language teachers into your home on one life the recordings

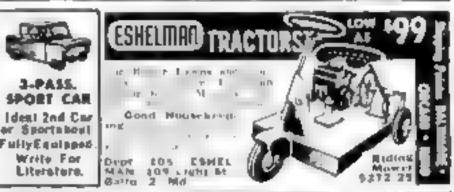
it a time define in another and hou listen for hear unities must and women conteres at at up only everythy matters. You Under-stand, how with the quick a case content of the orders of Parameter City Teach

Entiting Sections. Travel Opportunities Here and Abroad.

Linguaphone is used around the world by schools, governments business firms. Over a real on home study students of all ages have tearned mother language this ideal conversational way.

Step H sheep Start failing Send for ERSE Book and Details of FREE TRIAL Linguisphone (notificity, V-147-028 Radio City, New York 30, N. V







COMPLETE LOW COST SHOP METHOD HOME TRAINING NOW AVAILABLE

Oct in on Big Money opportunities in Plastic mobiling, custing, forming, carting, etc. hard 4d you learn with Interstate's professionally prepared course. All plantic maveria, «furnished.

WRITE FOR PREE **LOOKLET**

INTERSTATE TRAINING SERVICE DEPT. C-1, PORTLAND 13, OREGON

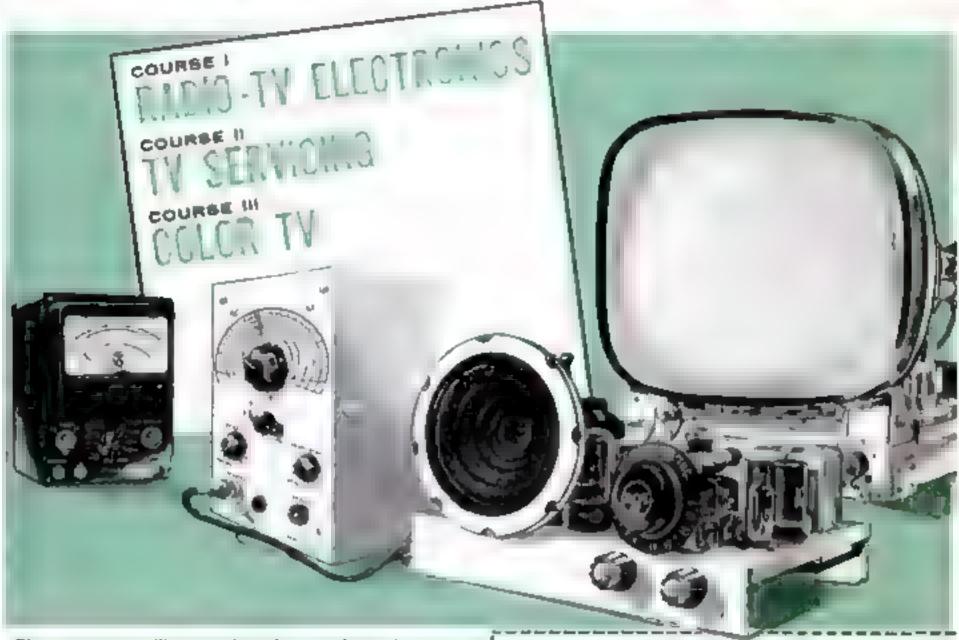


NEW? Practical, compact KEY PURSE with eard case, snap coin purse and 6 key hooks that postively holds keys in place. Natural tooling goat LEATHER, pre-cut ready to tool or stemp, has that "expensive look", Size; 2½" x 3¾", KIT complete, holes punched, snaps and key plate attached, goat locing, easy instructions and pattern. 50c postpaid.

FREE - 100 PAGE LEATHERCRAFT CATALOG

TANDY LEATHER CO. (Since 1919) **FORT WORTH 1, TEXAS**

RCA INSTITUTES (CO.) OFFERS YOU THE FINEST OF HOME STUDY TRAINING



The equipment Illustrated and text material you get with each course is yours to keep. Practical work with very first lesson. Courses for the beginner and the advanced student. Pay-os-you-learn, You need pay for only one study group at a time.



SEND FOR THIS FREE BOOK NOW

RCA Ins	stitutes, li	nc. Home	Study	Dept. 25-21
	of Radio Cor			
350 West	Fourth Street	, New Yor	1 14, N	i, Y.

Without obligation, send me FREE 52 page CATALOG on Home Study Courses in Badie, Tele-vision and Color TV, No Salesman will call.

Name Please print
Address
City Zone State
Korean Vetal Enter discharge date

5001 Cate de Liesse Rd., Montreal 9, Que.

RESIDENT SCHOOL courses in New York City offer comprehensive training in Television and Electronics. Day and evening classes start four times each year. Detailed information on request.

To save time, pasty coupon on postcord

ICAL BARGA

3" ASTRONOMICAL REFLECTING TELESCOPE (Farmer Mt. Palemer (rpe) See the Sters, Moon, Planets Close Upl 60 & 120 Power-An Unesual Buyl

414" ASTRONOMICAL TELESCOPE

DIRECT MEASURING POCKET MICROSCOPE

- 50 POWER

Fountain pen size makes direct reading measurements for checkunder powerful magnification Pre-

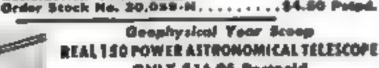


... \$7.95 Palpd. STOCK NO. 30,228-N ,

New | 2 in | Combination | Pocket-Size 50 Power MICROSCOPE and 10 Power TELESCOPE

Useful Telescope and Microscope combined in one amazing pression matrument imported. No larger than a fountain pen. Telescope is 10 Power Microscope magnifies 50 Times Sharp focus et any range Handy for sports, looking at small objects, just plain snooping. Send Check or M.O. Settefaction Guarantees:

Order Stock No. 30.032.



ONLY \$16.95 Postpold or to the Close, reservabers viewing of centers on moon etc. Since the fact of the center of the cen fin Print AT a. L. Ji actinomatic Stock No. 60,060 N

Larger 42mm objective model— (7 100) 2001 power-as store with the use of all the used free: 10 Hebye a Near hart and 10 page Ster Receipt). An athorn with the Hebre he Nige has Stock No. 80,001 N Handlook of the 859.05 Publicate

See The Sateliftes NEW, LOW PRICE "SATELLITER" TELESCOPE

Got ready for a terrific sky slow as more flatollites are vanited into a sent here there is registe
with our minus my Satel he Sente at all early of low rost Also view
commissions as a Hartfield Supple for your by star clusters. S power
while 12° flots are of high quanty was surplus optice makes
possil is this bargain
ktock No. 70, 130 N

We are the mir, of the famous "Moonwatch" Sale life Trinomeal

BUILD A SOLAR ENERGY FURNACE

fascinating new field. Build your own Some Furnece for experimentation -many practical uses Easy, Inexpensivel We furnish instructions This sun powered furnece will generate terrific heet—2000° to 2000° Fuses enamed to metal. Sets paper afterne in seconds. Use our France Lans-14% diameter fl 14"

Stock No. 70,130-N-package of 1 \$ 6.00 Petpd. Stock No. 70,131-N-package of 2 \$11.00 Petpd. Stock No. 70,132-N-package of 4 ... \$20.00 Petpd.

INFRARED SNIPERSCOPE TELESCOPE & PARTS

Her in the dark—without being observed War surrius Anthorseope M 2 Gost on a about \$1200 in furnal to see reads to use in cludes Power Pack info sed tichs where Will process for D 8 V auto his any Battery or transformer ava lable

\$150.00 f.e.b

Stock No. 65.052-M Have at I more money! Build your own Samer-scope! We will furn an instruction-sequents as a uding Power Park (P25) stage tubes light poils filters of For details—request Filtip CATALOG 'N'



WRITE FOR FREE CATALOG "N"!

GROUP BE 33008 MANUEL TRAD UNION DE MANUE GROUP 1547 MAIS DIE GLAPPANTIE EDMUND SCIENTIFIC CO., BARRINGTON, N. J.

unlimited opportunity for graduate engineers

Demand for our angineering graduates exceeds supply. Important firms visit campus regularly to interview seniors, industrial growth automation technical advances create cureer opportunities for engineers accountable, management experts. Share revends awaiting chance for a better life near? Start any quarter in this world-famed college. Approved for referent.

Bachelor of Science degree in 27 months

In Mechanical, Civil Electrical Chemical, Aeronautical, Radio CTV-Electronics Engineering in 16 months 4 kB in Instance identication identical hips back Accounting Motor Transport Management materials Superior students tong acce trate "16 works course in Itrafting Infrastre program, technical fundaments a succeed comprehensive courses with motor professions case beggs South closes infrastre courses with motor professions case beggs South closes infrastre courses with motor professions case beggs South closes infrastre and instruct the Englishment for the Englishment for superior and profession of the superior acceptance of the superior acceptance of the superior and budget require acceptance of the superior of the superi



Learn festinating problable trade from experis in spary time at home le save 9 1 0 6 0 les August and Rece Bondelet

Locksmilling Institute, Dept. 22-98. O Park Avenue E Butherfort, N J. 150 Park Avenue Lie by N J Sto e Board of Ed Approved for bett

N"I Made \$14,839 in 1 Year SERVICING RADIATORS!

Are you care no under MM fifts a year? Hundredg how making \$10 or \$1.2 that \$1.5 this a year series and \$10 the topic plant or not the topic plant of the topic plant bertit starts you brest tal

INLAND MFS. CO., Popt. PS-2, 1100 Juckson St., Omaho 2, Sobr.

Secrets of Venikil

Easy to team in 60 to 60 days with our Month Study Course BERULTS CHARANTEED. Make Miney! Be Poles at! James Fun life Opportunity! Radius. Televis in. Slage Appearances! For Prepinformalism regarding price and terms. WHITE You must state your are Papear Calabay Sec. MANGE HOME COURSE OF VENTRILOQUISM Box 25, Stadio PS 2, Revsington Sistion Delroit 24, Michigan

POSITIVELY NO

I made \$20,000 in one year without selling a thing-door to door, over the counter, by mail, or any other way All

I did was buy up junk jewelry. Then Uncle Sam paid me \$35.00 an ounce for the gold in it, less a small handling and refining charge. Send me your name and address and I'll show you how it's done.

I claim there never was a more interesting way to make money Positively no selling because the U S. Government is eager to buy all the old gold you turn in - at the established price Just follow my plan and you can find youk jewelry to boy in any community—large or smal I show you where to find it, what to per for it, how to test it and how to mail it to Uncle Sam for reserediate cash. I'll teach you the secrets by which I made 25 . 300 in a year with obsolutely no seiling charge for facts. No salesman will call. Send no moneyname, address on postcard. Write now to: LESLAE PATTON, 335 West Madison Street, Dupt. 12-B, Chicago 6, Ill.

=We'll train & establish you in=

Your Own Business

even if now employed

We are enlarging this 28-year-old world-wide chain of Duraclean dealerships. Many excellent locations are still available in the U.S.A. Canada, and other countries. If you are reliable and di gent, this is an opportunity to increase your income and have the freedom, financial independence, and prestige of TOUR OWN business

These are full time dealerships .

but you can start

In spare time and have a profitable, lifetime business when your present job ends. A Duraclean dealer will train and assist you. He'lt reveal his successful, proven methods and sales plans. He'll work with you.

Alert dealers can average \$9 hourly gross profit on service they render plus \$6.50 on EACH service man at National Price Guide charges. This business is easy

to learn . . . quickly established



You Become an Expert in cleaning and protecting Rugs and Upholstery

A Duraclean Deafership qualifies you to offer ave different pervices. Thus on many jobs you multiply profits.

1. DURACLEAN: Unique ABSORP-TION process for cleaning rugs, car-pets, upholetery. Recommended by leading stores and manufacturers. No acrubbing, sonking, shrinkage. Aeratesi form manufactured by portable e.ectric Posmovator, safely removes dirt. grease, unsightly spots. Dries so fast customers use furnishings in few BOUZE

2. BURASHIELD: Soll-retarding treatment that KEEPS furnishings dean MONTHS longer, So now you

may be the first in town to offer this type service

DURAPROOF: Protects against damage by moths, carpet heetles. Only such treatment backed by an Inter-national 6 year Warranty!

4. DURAGUARD: Aduther new service exclusively developed for Durac ann dealers A Dame-proofing treatment which reduces fire damage by retarding charring and the tendency of Bree to Bame up. Theaters, restaurants, and hotels, as well as homes, offer a huge potential.

B. SPOTCRAFT: Special chemical products which enable you to handle most all spot or staining problems means extra business, greater oustomer swittefaction, and added prestige for you as a professional craftsman.

No Overhead Expense Repeat and Voluntary Orders

Permanent, Growing Market

Service is rendered IN homes, offices, hotels, theaters, institutions and to revive used-car apholatery for auto dealers. There is need for these services in almost every building Duraclean dealers operate from their home an office or shop, as they prefor It's easy to learn tre quickly train you Hendering service yourself at first prepares you to train and supervise survice inen

What Dealers Say

M. Louis (Chro); 2nd year should bring me \$100 mm; but year was \$40 000. Hilyes, constant bein made it Designation E. F. British (Nerse, S. D.): I'm 10 and do all appelling myself. One job. Hotel Tamp brought 3050 00.

Ye Look chi t. Mt. Look a. For Many chest opera. I've (Dura chenges) every year place I started 37 years now.

E. Roddy (Hampton, Va.). First 12 days of January I aid 3500 business. Approved to be an all month.

A. Wilson (Tules). Never beet no sold strange billion of the contract of the contract

out performs untilling offered to far competition, Komuri (Jagun) We have 1.000,000 year contract (Oursicleaning for the U.S. Army



FIRST PROCESS IN THE FIELD SHIP

As a Daractean dealer, your services are backed by this famous seal of quality.

proof that Daractean has assued rigorous trets. He tempet for in your town can benefithis seal Ouractean has also been totaled and certified by the American Artearch & Vesting Laboratories. He wander it's so tony to get business!

FREE Booklets



Our first letter and illustrated backlets will explain everything-the two modern, argently needed services, waiting market, how business praws, your large profit, easy terms and PROTECTED territory. Clip and mail coupon today? Bet all the facts . . , no obligation.

Duraclean (

8-162 Beraciona Balg. DEERFELD, ALDINGS.

Domanstrations win Service .

DURACLEAN Desiers and REPEAT and VOLUNTARY orders a major source of income. Customers, enthused with results iell friends and neighbors. Furniture and department stores and others lurn over rug and upholstery cleaning and molh-proofing to DUNACLEAN Dealers. We show you 27 ways to get new customers

EASY TERMS

A moderate payment establishes your own businass—pay belance from sales. We furnish electric machines, folders, store cords, introduction slips, sales book, demonstrators and enough material to reform your TOTAL investdiametri.

We Help YOU Grow

Our MUTUAL COOPERATION program gives you many unique and confintions ad-tantages Mational Advertising in Life. McCail s. House & Oarden Canadian Homes & Cardens and a dozen others. Cortificate approves equipment and ma-terials Products insurance. Six-year Warranty, Pocket Demonstrators, Sales Sook, Advertising Folders & Cards, Tested Ads. Ad Cuts & Mats. Store Display Cards. Radio & TV Musical Commer-cials. Home Show Booth Display, Publicity Pragram gets FREE local newspaper stories Prizes. Laboratory research and development Monthly Magazine. Result Service. Annual Conventions, Behind all this is a 20-YEAR-OLD headquarters interested in YOUR persons, success If you want to become the owner of a BURACLEAN Service business, you should inquire now TODAY, while terri-

Mail Coupon—We'il Send You FREE Booklets!

"DWN a	Business"	Coupon
--------	-----------	--------

Without obligation	OWN a growing busine	Decrificial, Militario lietter giving full details. ess of my own built upon
Name		
Address		
City	County	State

The Amazing Potentialities of Memory

LITTLE thought when I arrived at my friend Borg's house that I was about to see something truly extraordinary, and to increase my mental

powers tenfold.

He had asked me to come to Stockholm to lecture to the Swedes about Lister and other British scientists. On the evening of my arrival, after the champagne, our conversation turned naturally to the problems of public speaking and to the great labour imposed on us lecturers by the need to be word perfect in our lectures.

Borg then told me that his power of memory would probably amaze me-and I had known him, while we were studying law together in Paris to

have the most deplocable memory!

So he went to the end of the duning room and asked me to write down a hundred three-figure numbers, calling each one out in a clear voice. When I had filled the edge of an old newspaper with figures, Borg repeated them to me in the order in which I had written them down and then in reverse order, that is beginning with the last numher. He also allowed me to ask him the relative position of different numbers: for example, which teas the 24th, the 72nd, and the 38th, and I noticed that he replied to all my questions at once and without effort, as if the figures which I had written on the paper had been also written in his brain.

I was dumbfounded by such a feat and sought in vain for the trick which enabled him to achieve it. My friend then said: "The thing you have just seen and which seems so remarkable is, in fact, quite simple; everybody has a memory good enough to do the same, but few indeed can use this won-

derful faculty."

He then revealed to me how I could achieve a similar feat of memory, and I at once mastered the secret—without mistakes and without effort—as you

too will master it tomorrow.

But I did not stop at these amusing experiments. I applied the principles I had learned in my daily work. I could now remember, with unbelievable facility, the lectures I heard and those which I gave myself, the names of people I met-even if it was only once—as well as their addresses, and a thousand other details which were most useful to me. Finally, I discovered after a while that not only had my memory improved, but that I had also acquired greater powers of concentration; a surer judgment-which is by no means surprising since the keenness of our intellect is primarily dependent on the number and variety of the things we remember.

If you would like to share this experience and to possess those mental powers which are still our best chance of success in life, ask L.O. Borg to send you his interesting booklet The Eternal Laws of Success—he will send it free to anyone who wants to improve his memory. Here is the address: L. O. Borg, c/o Aubanel Publishers, 14 Lower Baggot St.,

Dublin, Ireland. Write now-while copies of this booklet are still available. L. CONWAY

SPECIALI Deduct 10% ad erders for Two or HISTORIANCE POLICY given with each med the sold. We guarantee the subsect of service you say for. MUWHERE CAN SUCH QUALITY BE FOUND AT SUCH LOW PRICE! YOU CAN'T LOSE GOODTEAR SUBURBANITE TYPE SHOW TIRES New Tire Subrentes-Fastery Rebuilt MEST WINTER TRACTION OF ALLI \$70:15 \$9.95 | 710:15 \$50:16 \$50:15 \$10.90 Super Quality — Russed Perferences — 6 Morths Incured Service 600116 63 63 670115 63 95 700116 64 63 760116 6 75 620118 6 95 630116 6 35 620113 6 95 630116 6 35 620113 6 95 630116 6 35 620113 6 95 Spordy shighwats on Mail Orders. F O S. Chi-cajo insurance policy sent with each order De-duct 5P % on orders for S or more used tires. Sent CHECK or MONKY ORDER —No COD's 2701 S. Normel, Dept. 35-56, Oriceps 9, 111. MIDLAND TIRE SALES ANOTHER OF INDUSTRY'S

INSURED TIRE SERVICE



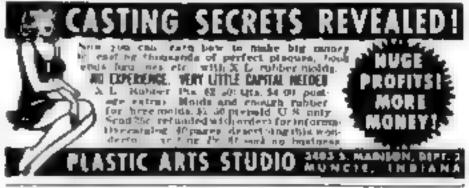
MOST-WANTED MEN

Electrical Engineering Technician—interesting, rewarding future for mon with basic qualifications. Let I.C.S. help you prepare yourself.

SEE SPECIAL DPPORTUNITY CHECK-LIST--PAGE 51



226 7th Ave. H. Dogt 41. Husbrille 3. Tono





BUILD and FLY Bensen

HELICOPTER

Glider type 'copter-easy to build, simple to fly Can also be mounted on floats or boat. No pilot's license required. Order 3-view drawings, specs and photo for \$1 Motor powered Gyro-Copter drawings \$2,

and the state of t

of the sole opening management and appear that

Ask about detailed plans and construction kits. BENNEN AIRCRAFT CORP., Dept. PS-28 P. O. Box 2725, Raleigh, N. C.

Name. Address. Superior's New Model 70 UTILITY TESTER®

FOR REPAIRING ALL ELECTRICAL API rors • Aut



As an electrical trouble shooter the Model 70:

- · Will test Toosters, Irons, Broilers, Heating Pads, Clocks, Fans, Yocuum Clasners, Refrigerstors, Lamps, Fluorescents, Switches, Thermestots, etc.
- Will test all TV tubes for open Riaments, inter-element shorts, burned out tubes, etc.
- Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, Loakopo, etc.
- Will measure current consumption while the appliance under test is in operation.
- Incorporates a sensitive directreading resistance range which will measure all resistances community used in electrical appliances, motors, etc.
- Leakage detecting circuit will indicate continuity from sere ohms to 5 megohms (5,000,000 ohms).

As an Automotive Tester the Model 70 will test: • Both 6 Yolt and 12 Valt Storage Satteries • Generators • Storters • Distributors · Ignition Coils · Regulators · Relays · Circuit Broakers ■ Cigarette Lighters
 ■ Stop Lights
 ■ Condensors
 ■ Directional Signal Systems ■ All Lamps and Bulbs ● Fuses ■ Heating Systems ■ Harns ● Also will lecute poor grounds, breaks in wiring, pear connections, etc.

IT'S SO EASY!!



With tester's cord in outlet, pur-runt erratumphum of applicance is front or motor when time cord is comperted to receptacie un-pained This typical feet taken I famperus (Cloud)



Copies describe at most formand-pas to valta strained from step-scribt transformer News to how to check prome thermanich to see if wire he is are live.

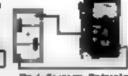


Omati electrio fan motor hidsenies. De electa (normal resistation):



himmed supplied with Model to show mother number moves to light when test leads are removed to pine 3 and 4 of this 4ACE table Provider (at he log all tables mod-in TV are detailed in maken).





READ THIS!



READ THIS!

INCLUDED FREE!!

This 64-page book—practically a con-densed course in electricity Learn by

Just read the following partial list of contents:

 What is electricity? • Simplified. version of Ohms Law . What is wettage . Simplified wattage charts . How to measure voltage charts a How to measure and leakage . How to test all electrical appliances and motors unless a simplified trouble about the sim

motors using a simplified trouble-shooting technique.

- . How to test all TV tubes, also simple procedure for determining which specific tube (or tubes) is countrie the trouble
- . How to trace trouble in the electrical circuits and perte in automobiles and trucks.

Model 70 comes complete with above S book and test leads. Only . . .

READ THIST

You don't pay for the Model 70 until AFTER you have examined it in the privacy of your home! Model 70 is

<u>NU MUNET WITH UKUER</u>

Try it for 10 days before you buy. If completely satisfied then send \$3.85 and pay balance at rate of \$4.00 per month for 3 months-No Interest or Finance Charges Added! If not completely satisfied, return to us, no explanation necessary.

to days and stos postage secount,	me one Model 70. If satisfactory I agree to pay \$3.85 within I balance at rate of \$4 per month until total price of \$15.85 is paid. If not satisfactory, I may telum for cancellation of
Home	
Address	

Make \$500 an Hour CASH PROFIT THE DAY YOU START!

START YOUR OWN BUSINESS AT HOME . . . SHARPEN MOUSEHOLD, GARDEN AND SHOP TOOLS IN SPARE TIME

Now you can turn your spare time into Big Cash Profits with new BELSAW SHARP-ALL. Sharpen knives, scissors, shears, snips, ice skates, mower blades, hedge trimmers, grass whips, axes, chisels, screw drivers, scrapers and saws... just about any household, garden and shop tool. Your own CASH business in 15 square feet of your basement or garage . . . all your prospects in your own neighborhood. No calls to make. No experience needed. No inventory. Your SHARP-ALL quickly pays for itself.



FREE BOOK tells how to start your own cash business.

Learn how easily you can start your own spare time business. Amazing low cost, easy-payment plan. Send coupon today for FREE SOOK.

BEL 708 Field	SAW SHARP-ALL CO Bullding • Kansas City 11, Missouri Send me your FREE BOOK.
Nome	

Address. City and State..

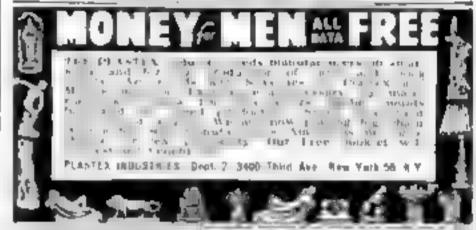
BECOME AN EXPERT IN TRAFFIC and

TODAY qualified men in this field earn \$4,000 to \$10,000 and up. Thousands are needed. We train you in spare time at home for executive positions in Traffic Management.

LaSalle's complete Traffic and Transportation program gives you a thorough knowledge of this held Program covers Transportation Agencies—How to Ship by Rail, Express, Water, MOTOR TRUCK, Air, Freight Forwarder and Mail Carriers.

Investigate the splendid opportunities available. Low cost easy terms. Placement counsel and help. Write today for FRFE 48 page book "Traffic and Transportation —the Fast Growing Profession."

LASALLE A Correspondence Institution



POWERMOWERS, AND ALL & 4-CYCLE GASOLINE

Repair your own equipment or MAKE EXTRA MONEY in this growing field Pully illustrated easy-to-understand, Home Study Course. Write for FREE information.

INCOLN TECHNICAL INSTITUTE SUITE 2-G, 472 MARKET STREET, NEWARK S, N. J.

COMPLETE LETTER & NUMBER QUIDES

GOTHIC by to, 1, 1% 1% in included 50 over 100 o At Start makey Variably Att STENSO LETTERING CO. Ball. 10, MA.

TE ELAFAYETTE CATALOG THE BEST BUYS IN THE BUSINESS

Packed with the largest pelection of Electronic, Radio and T.V. Parts, and equipment, PA. H: P1 systems, tubes, antennas, Translator Kits, parts and components, Test Equipment, new build your swn kits, looks, books, Microscopa, drafting equipment, Binoculars, Telescopes,

FREE COPY TO	CK FULL O	er-ALL AT G HTICOMER, deal F BUYSI SEI	MEAT BAVINGS et, engineer and NO FOR YOUR
	Name		
	Address		
2 1	Сиу	7.	neState
Bopt 1:	Sa fayette	Radio "	ionaica 22, N. T.

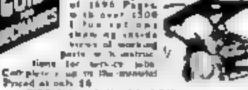
WANT TO KNOW



This The Prochase Book gives full MI FORMATION. covering the principles course of a lightest, sector is had repaid of dept-ern over tracks and impre-

Desel Ingoes, Hydramotic and Herá Deven Fully Englained.

A receptor guide
of 1896 Pages,
with over \$200
I have set one
chare of worked
berow of worked
party with analysis



CHICLE No I IN COUPON

HOW TO NOME APPLIANCES

BOTSES

Many other GAS AND SITCIFIC APPLIANCES.

HOWERS GANGI1

PACOUNT

Handy Reference for Etritics & Got Service men. M. non- a Dealers and More-owners Explains Seathy and simply have so hunds from the Poor is need remnantable and number Wining diagrams. 000 Feets Basy to test Answers ALL year specimes. 564 Pages Ober 1846 Only 88.

CHECK! No 2 HI COUPOR



TELLS HOW PO SERVICE LIBRARY

MESS IN LAST Industrian Follow A MARKET FORM FOR SER REPORT A SERVICE MESS ASSESSED FOR SERVICE MESSAGE FOR SERVICE MESS ASSESSED FOR SERVICE MESSAGE FOR

TWO COMPLETE VOLUMES 108 Pages Dh's Twestre aven need
Degrame OOF engories Facts and
Figures on Madery TV Red of
Richard To ave 1MCLL ES
TRANS 579FF & Transmitter Coruste Mr. For Po and Changers
P. & Bretens Photograph Pale ups.
F. M. Auto Rusia Shore Warn,

Basic prin pice,
Construe on 2n
ete e en Opere.

Sina, Repaire, Trackle Shanites Hom in
pet Sharp Close ZV Pactures Install
As tals Have in Test Registers Ct IP
SYSTEMS, Matheda of Convention Terms
to Includes wites Nigh Enquery Quick Includes wire Nigh Proqueery Queb

fetelerite of the 44 a hime southy course. Only 58 for CHICLE No. 2 IN COUPON

KNOW YOUR TRUCK

The TRUCK & TRACTUR Go at E for Mechanic & Dr. sero, Faryman, Garagemen Holpers Denne's Templic Bitestaps Farman six Covering One & Dennet Makey Pracquites Covering to a Performance Benders Bertages And Antonomics Reporter Benders Bertages FULLY BLUSTRATED Index Only 55.

CHICLE No. 5 IN COUPON



TTERS GUIDES



Practical Trade Associant & Poler Principles Treads Associated in Principles of the Esphishists in pital tongularity and by clear illustrations disagrams, what is, graphs and principles in mode in plants ag principles in mode in plants ag principles of the Control of the Pages 2004 Designates in Illustrations Only 2004 Designates in Illustrations Only 2004 In the complete art of team.

CIRCLE No. 4 IN CONFOR

PAINTING & DECORATING MANUAL

Junio Trado information on outside and could need here to mus passes, proparation of terforary pages hanging, would founder, have synthesis paints color twith raise dust termy squipment, cutts, estimating and decorating, 464 Pages, Pully Electroted, Only 52. CINCLE No. 7 IN COMPON

EXAMINATION 7- DAY FREE

SEND HO MONEY - Pay the posterior solding. We are glid to used you may all the Audel Quadra or absolutely. PREE expressions on your pers home. We take all the risks and bears all the decreases up in YOU There is no obligapaid bears all the decreases up in YOU There is no obliga-tion! If you decide to keep the backs of your charm you stay pay for them, under our interesting every-pay plan of only pay for the

HERE IS ALL YOU DO

THE EASY TO OFFICE In the Poster Mail Order THE EASY TO OPPOSE In the review the searches of many the register of the right just drive is right around the searches of Audot Doubles you want us to used you be FREE EXAMINATION We will read those to you at fact to EXAMINATION We will read those to you at fact to both you build a brightes furgic by marming your EXILL. If for play reason of all you are not COMPLETELY mus-feet, sylven the hands to us, and that still and the separate NO STRINGS OF CATCHES TO THES OFFER.

THEO. AUDEL & CO. 49 West Mird Street, Mart Turk 19, 10, 7.

LDERS GUID



PRACTICAL STOPEHOUSE OF MICEPA CONSTRUCTION IN carpusters and all wondworkers. Explants were integrange and he gen-face distribute processes above es-short as trade for a sit bland on the NEWEST adventuring Vot 1 Tools steel square gars M-

on the NEWEST offermance.

Vol. 1. These reset against and March protects form are not. Vol. 2.

Buildess are Service in drawing plants specifications and form formation and the formation of the service in the service the servic

CIPCUI No. 8 IN COUPON

PRACTICAL ELECTRICITY

a COMPLETE MANDEGOR Outh samphhet made refused to Complete metals on and produce a former of the share and the states and the share and the share and the share and the share are the same that are the same to th tennique. Priced a

CHICLE No. 4 IN COUPOR

ALL MERCE IN TO SEN IN A BOLLY M. WEELS I SANS. ENGINEE Board print plus searching on its timing for purple for mys time compression in Compressions, problems pumps for unking systems of ALCOHOL: arron, chiculottens. 810 Pages Putts seriously Press 52 CHICLE No T IN COUPON

VELDERS GUIDE CHARLE ELECTRIC CON MICH. traiding It wheel shots age and year solds present use who had abore from opposit began being and other margin Airplane month to fair building hard facing surmage CIPCLE No. 10 MI COUPON

MATHEMATICS MADE EASY



A COMPLETE NOME SYLDY COLUMN. Signing with the first principles of an elemenidenticing step by step th righ the ear and plages of exphenester in highing he pulse and plages of math. for uniform for my barried and electrical problems. New EASY carried methods, Inand other tree of

chades plane and finish geometric to geometric start in each cubic ste. Pro-to-at tests reference tables and data. More to my ship rate 753 Pages 550.2 Susteen one President party 6.6. CHICLE No. 11 IN COUPON



M. DEEK MACHINE SHOP PRACTICE IS PRACTICAL SCORES IN ONE New you cours to rever Trite how to set up and operate before total and military marketer, theyers for present and off other was been tools & COMP PLETE INSTRUCTOR AND MESS RENCE BOOK, 1728 m Faily attacement Property or under \$5.

CHECK No. 12 IN COUPON

WIRING DIAGRAMS

The limit provide gracified facts as using of startered oppositive. It explains showly and Schiff, V how in more expectation has all finds of she inspire. Early dispress in complete and self-explaining flags: pure MOOK LIPIN 204 Pages, EDustrated Only \$3

CIPCLE No. 13 IN COUPON

REFRIGERATION &

AT REAL PROPERTY. to S. Common & Education 1 to S. Common & Education 1 to S. Common & Education 1 to S. Common & S. Com a hornete GOLD WINE of Purchas

CHICLE PL. 14 BY COMPONE

Comparinty up to-date 1160 Pages, Pully Electroted and Indexed, Priced at acts 50

A COMPLETE ENCYCLOPEDIA applicating at the peopless serves the fundamental procept totach of applied elements

A COMPLETE COLLEGE SDUCATIONS

Fully alkestrated with designance and shatches, collecterings and valide for ready rates are Questions and appears. Trial tests for province study and covers. All being on the most requires theory.

Vol. 1 Processles and roles. pt are or a segmentary, strategic beauty

Vol. 3 Testing sestiments and tests at range ha tery runder and repairs. No. 17

Vol. 4. Alternating recent forms? In oil afternation, crassformers. No. 18

Vol. 5. A.C. Mossey windrapi maintecanie i un estefa, en iches, foten etc. No. 19

terrene, plane, code, etc. No. 21

Vot 1 Rathage, signals, ele-arces (garbon etc No 22 Val B Bedig telephone, telegraph eterinam, marang partures No. 43

Vot 6 Raingerance, ittede create appropries, lader. N = 44

7 000 fully structured pages, Prising of only 120 for the garried 587 this said pages valuelly for \$2 and



ALL TYPES OF BLUEPRINT READING

How to read males, the standard symbols deter and assert point is along the one which is a being him a stad agreement T to Make to be CAN BLAD PLUEPRINTS of the Line FOR A RETTER JOB This book gives you want to tenguage they be then a congruinged 448 Pages, of Fighty abbest about Proposed 418. Very Pully attest about

C SELE No. 25 IN COUPON

me was takend on mastern procless controlling from the figure and distance vertices point. Vo. Do in many breakinging bandong designs Vol. 2—

Ber in countries or tex. In the patternating Vol. 2—

Controlls receiving pile sig better development of the Controller of texture Vol. 0

Planering arone requirery also constructions biorphism.

4 Vol. 1960 Pages 2067 Blood arone C. Augista Set unit 18. CIRCLE No. 36 IN COUPON



ELECTRIC MOTORS
This Girles award the construction. North tipe and the construction of the same and trimbile object. age can rel importunance and trackle shoulding of all types of meture. Includes armeture

mending Explains entire subject in grant de-tal in origin language. Over 1916 Paper of information. 612 Diagrams. All agest of control help (Boo-trated and induced for randy sets raise. Proved at early 85. CRECK No. 27 UN COUPON

New represent explaining at detail both dumants and industrial oil burners. In-cludes electoral high ups and uring thaattaction contains the operation testing are trained and repaid of all equipment Indicated but route as a reserve. Only 416 Pages, 310 Electrobane and Diagrams. Only \$2 strong the theory

CHELL Nº 30 IN CONDON



APPITIONAL IMPORTANT

The following Audel Gorder are off the bret in their field, or two to less ample technic off langifity flast and Carrie the new large wanted in the MAIL ON ER C. II. PORT below, All technics are few for PARE EXAM MATTON on 19 30157 MITA PATTEN 2ATOUTS 1917 Pages 17.50 No. 30 30157 MITA WORKERS MANON BOOK.

100 Fages 10 10 MCCMANICAL DEAMING SUIDE 197 Pages 2 10 MIL 23 INC. MAIL ALL DEAMING SUIDE 197 Pages 3 10 MIL 23 INC. MAIL ALL DEAMING SUIDE 197 Pages 3 10 MIL 23 INC. MAIL ALL DEAM ING. AND SOLICE.

Mo. 31 INDIVIDUAL ORAW NG AND DESIGN.

400 Pages

No. 32 P-FTEONIC DEVITES THE PAGES

No. 34 E-12-TRU AND ELAMINATIONS 772 Pages

No. 36 E-12-C DICT OWART A CAILAT DISK Pages

No. 30 E-12-C DICT OWART NOOD TERMS

No. 30 POWER PLANT ING STEELS GUIDE THE Pages

No. 30 ENG METER AND FIRMANT FAARE SEE Pages

No. 30 OFFERTING FOGURERS SHARE THERE SEE

No. 40 POWERS HYDRAULICS AND ARE COMPRESSORS.

1750 Pages

No. 40 MOUSE PEATING QUIDE 1000 Pages

NO PISK COMPON TODAY

	_	_	-	_		
THEO. AVMIN. S. CO. — Self Empreyerant Publishers State 1679 — Sug. 49 W. Elird Street, New York 16, N. T.	1	2	2 (
Private most use the 7 depth FREE EXAMENATION the hashed have storing at right, 2 opers to most 12 in 7 days up such book or not artisted, and to further sould 12 or	7		٠	10	11	
wouth an each hash or not undered until 2 hose paid the parthus press plus dispoing ports. If 2 are not completely mended with my Audid Quales 2 may print, them.	13	13	Н	10	10	
NAME .	67			10	-	
ACCOUNT.	11			10		
OCCUPATION				39		
SAVE SHIPPING COSTS! Clock have it you worken annulate page	34			35		
and and the coast one and a let make the bat-	37	- 36	34	- 40	41	

that with order. We pay protogo alongos. For hore some ratios privilege,



Here's Your Opportunity to get into the BIG MONEY CLASS FAST with sensational PRESTO FIRE EXTINGUISHER

Over 3,000,000 Sold for Homes, Offices, Autos, Service Stations, Stores, Farms, Boats

Not everybody makes \$1,000 in a month to start out, but read this: Florida salesman reports \$600 in 1 month. Ohio man earned \$2,100 in 2 months! Men everywhere, even in off hours, are rolling up amazing profits. Here's why, PRESTO's amazing new chemical, developed as secret defense during war, is 11/4 to 6 times as effective as ordinary chemicals on equal weight basis. So PRESTO can be light, so handy a child can use. How about you cashing in on this great invention?

HAS ALL THESE DESTRUCTION • Ends lire as fast

OMLY PRESTO

Folks are

Amazed when

you Tell Thou Liber Main, Millell

of Protection Costs Only

- All 2 seconds
- Noedt na tagget m or recharge HHE
- Outperforms Butter costing much more
- Dear intered for 20 penes

Why Large Profits Are Essy

Everyone in tor ned by FDUL! 30'll sus course seem would be our this provide who specifies of an arms of Most people who specifies to account to accept at the built one or more I so nak as a cel as on gyay one feet sturbed in faulrich sterr field new

Complete Sales Outfit FREE!

Ms I compon for the Himsteried Sules Kst. with even things on most to take the conhis tate can gost tog \$10 F i etch \$40 rou con I be mak as Es extranc FRFE en obligation so MV LOOL ON TO

BIG MONEY LIKE THIS EVEN IN SPARE TIME Reports 500 a Week.



Averaging less than a days than a due of two mark then a due to the mark that the two the two the two that the Calife Mr.

Averages \$15.20 m Hour

Far ranta bour I devoted to ramed as as rrage of 43 20 W P Write his,



MERLITE INDUSTRIES INC. 144 E. 32nd 84., Dapt. P. 16F New York, New York

MERLITE INDUSTRIES INC. (Presto Div.) 114 E. 32nd St., Dopt. P-18F. New York 16, N. Y.

High me complete Rules (1929) with full details how I can make I the current twey first day with Presto Pire Extinguisher. Al. a FREE, no obites con-

Name

Address.

Zone In Camela, Mopa Co., Ltd., 371 Dowd St., Montreal 1, P.Q.

Shrinks Hemorrhoids **New Way Without Surgery**

> Science Finds Healing Substance That Relieves Pain—Shrinks Hemorrhoids

For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain-without surgery.

In case after case, while gently relieving pain. actual reduction (shrinkage) took place.

Most amazing of all-results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne*) -discovery of a world-famous research institute.

This substance is now available in suppository or ointment form under the name Preparation H. * Ask for it at all drug counters-money back guarantes.

*Bog. U S. Pat. Off.

PRICED



(d) ---

ATES

PR 4

LOWEST

COUNTS UP TO 950 990 990 IDEAL FOR BUSINESS AND PERSON. AL USE-QUARANTEED ACCURATE At the Guaranteed Accurate

Note toy Operates with only a thirder

Orch Adds subtracts multiples, disides Couple up to one in Person

for Read over and over idea title for

Suntages income Tax and School test in Person

Suntages income Tax and School test in Tax

Side XY BA & QUARANTEE Round

Tax Book Y BA & QUARANTEE Round

The Tax

Side XY BA & QUARANTEE Round

The Tax

Side XY BA & QUARANTEE

The Tax

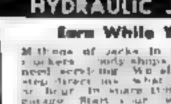
Side XY BA & QUARANTEE

The Tax

Side XY BA & QUARANTEE

CALCULATOR MACHINE CO., (Mins)

Bax 128 Dopt. F-R2 Huntingson Valley, Pa.



HYDRAULIC JACK REPAIRS

Earn While You Learn at Home

Mithiga of sacks in was A autologer or stations to there mody ships throw you like the carried seems in the what only to the Table Table to the true is shall be the Table Table to the carried shall be shall be the true to the carried shall be the true to the carried shall be shall be the true to the carried shall be the ca

Institute of Hydrovlic Josh Ropair

P.O. Sex SO, Bloomfield, M. J.



the estary equipment in uding a super charged diamond blade for sawing and all the wheels for at adding abapting and publishing also complete indicated an abapting and belt for only \$15.50.

(a) Burling on Wiscone a Write inday for information and diera-

SES MANUFACTURING CO. Dept. S. Serlington, Wis.

New Isotronic Training Method

LEARN TV REPAIR IN ONE SHORT WEEK

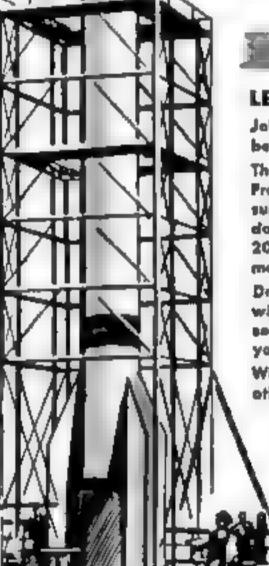
Now, after 5 year's research-a streamlined training system that obsoletes all others! In just 7 days you may earn \$150 weekly, without paying up to \$250 for training, studying long months! Developed by electronic scientists in cooperation with major TV tole's, the new Isotronic method is the most practical ever devised! For conclusive proof, write for details and FREE SAMPLE LESSON. Use it on your own set or a friend's repair it - convince yourself you can make big money immediately in your own TV business! Hurry - Free Lesson supply limited. Write Electronic Engineering Co., Dept. B-182,

1038 So. La Bree, Los Angeles 19, Calif.

NO LAYOFFS

for men skilled in . . .

DRAFTING!



LEARN AT HOME . . . QUICKLY . . . IN YOUR SPARE TIME!

Job security, rapid advancement, big pay checks are only a few of the many benefits enjoyed by mon with a C.E.I. diploma.

The opportunities available to well-trained draftsmen were never greater! The President is deeply concerned about the shortage of technically trained men such as draftsmen. The need for skilled draftsmen is tramendous and is growing daily. This vital shortage has existed for 15 years and will continue for at least 20 more years. Never before has such a golden epportunity been affered to men like YOU!

Drafting is the only field which makes it possible for you to obtain easily, without any special background or experience, a professional, well paying, secure, important future. C.E.I.'s staff of licensed professional engineers show you how to gain this good in only a few short months of spare time study? What a Cleveland Engineering Institute diploma has done for thousands of others, it can do for YOU, too! Write for full information today!

* VETERAN APPROVED

YOUR CHOICE OF EASY, LOW PAYMENT PLANS. NO CARRYING CHARGES!

EQUIPMENT AND SUPPLIES FREE OF EXTRA



You, Too, Con Hove MORE MONEY - PROFESSIONAL RATING - SECURE FUTURE



Strikes and layoffs are nightmares of the past. C.E.I., training opened the door to a wonderful future for me and my family.

H. Oaftering, Ohio



C.E.I.'s course has helped in many ways; reised my adecation rating, technical rating and income.

J. F. Beltchun, Conal Zone



MAIL COUPON NOW!



My C.E.I., training has advanced me from a job as a laborar to a position as Jr. Engineer with big pay increase.

J. Mergan, California



There is tramendous personal satisfaction on finding your-self in demand because you are a skilled professional I recommend C.E.I. a course to anyone interested in financial betterment

Anthony J. Miler, Penn



CLEVELAND ENGINEERING INST., Dept. 12-20
6300 Euclid Ave. Claveland 3, Ohio
Please RUSH my Free Succest Book and Lesson
Aeronoutical Mechanical
NAME
ADDRESS
CITY AND ADDRESS STATE - CONTRACT
No Obligation — No Salesman

ENGINEERING INSTITUTE ENGINEERING DRAFTING EXCLUSIVELY

"TOOK IN \$217 FIRST 10 DAYS"

Some make more, some less ...

We help you to start Your Own All-Year Business

Make Big Money! With our easily operated. highly efficient wall washer. Charles Stelle took in \$217 gross in first ten days, E. L. Goss took in more than \$10,-000 in one year, E. C. Taber wrote, "I made \$400 gross in two weeks."



And no wonder...this machine washes walls 6 times faster and better than by hand.

Your Meney-making Opportunity. We want more men to go into this profitable business for themselves and enjoy independence—freedom from bosses, layoffs. Customers everywhere-homes. offices, schools, churches, hotels, etc. How much you earn depends largely on you. What you take in is mostly profit. No need to rent shop or office; operate business from home. Can start spare time until your full time is available.

Lose no time. Get all facts without obligation

FREE BOOK! MAIL COUPON TODAY!

VON SCHRADEE MFG. CO. 211 "W" Fl., Rocino, Wisconsin

Send at once (no obligation) your FREE booklet containing information about your WALL WARRING MACHINE and how I can start my own permanent, profitable business.

None.			
Address			_
		4	

KEEP	1		4 1 4 4		ACCURACT PL 11 in
Maria		A	111		
PW WHITE			V	-	POWE
F140	man u		COMP	1	MICHARY

AIR OUNS & CO, GAS GUNS. Benjemin Super CO2 Rocket Gos Platel

with 3 Stage HI-LO An low na \$13.95 Al Mudels Benjamin CO2 Carbine Gas Rifles and Benjamin CO2 Rocket Gas Philols Use Standard Ster CO2 Soulat Carringger 2277 H 49.46.4 everywhere) 2-Stage M-CO Jer Power - Mgh for Small 22 Game Law for Target-I p to 30 Dots from Each

Carriedge No Pumping - Securety - Sely - Economical - HeaTmic-12 Models BB or +77 pr 22. Benjamin Air Rifles and Benjamin Ate Perols are Recognised Atl Over the Wireld life Finest Workmandisp and Highest Quarty at lowest Prices. Ad ustable Power with Amazing Optimum Force. fully Contractions-Accurate-Sale-Communical Easy to Use Anywhere-12 Mudels for Target and Small Game 22 or 177 or 3th from \$13.5th

mie Air Cana & Calaing	852
CO ₂ Cons & Sup-	Name
price. Nation, memory saving Early	Addr
Offer un Hearting & Fishing Brien!	Сйу

Madels Bergin | Send Gun | BERJAMON AND ROPLE CO. | MAIN TODAY |
Madels Bergin | Culaing | 852 SARST ST., ST LOUIS 4, 600, M. S. A. |
CO2 Goes & Sup- | Section | Name | dalress.....

State.

EMPLOYED MEN! Make up to 40<u>00</u> EXTRA a week!

> SELL FRIENDS NEW WORK, DRESS & CASUAL SHOES IN SPARE TIME

Demonstrate new patented Air Cushion comfort. Simple 2-finger demonstration makes shoe selling a snap. Exclusive "Trade-In" Offer gives customers cash for old shoes.

Advance commissions to \$5.00 a pair, Cash boous. No investment required. Samples supplied, Write NOW for FREE Outfit. CHARLES CHESTER SHOE CO., Dept. 8-5819, Brockton, Mass.



Full

Leather

BE *FREE* FROM TRUSS SLAVERY

Now there is a new modern Non-Surgical treatment designed to permanently correct rupture. These Non-Surgical treatments are so certain, that a Lifetime Certificate of Assurance is given, Write today for our New FREE Book that

gives facts that may save you painful and expensive surgery, and tells how non-surgically you may again work, live, play and love and enjoy life in the manner you desire. There is no obligation. Excelsior Bornia Clinic, Rept. 3765, Excelsior Spgs., Me.



STUDY TO BE A DOCTOR

of Psychology or Metaphysics

Obtain a Ps.D., Ms.D., or Ph D. Be a Teacher, Lecturar or Accredited Practitioner Teach others how to achieve Health, Happiness and Contentment, Chartered by State. Correspondence courses only. Write for FREE book telling how,

THE NEOTARIAN FELLOWSHIP

Desk 6. Pickwick Bulldlag

Kansas City 8, Missouri



24 YEARS AT THIS ADDRESS "We Have He Best to Pay." That is Way We Can Sell for Last Written Suarantee Sent. SERO AD

EVERYBOOT 10% of

Free-Tube With Each Paltergut Tire One of the eldest distributors of slightly used tires in America.

REE CIVE ONE tire FREE, on each order, Dees not in-

WHITE WALLS \$1 00 EXTRA-12 MOS, WRITTEN QUARANTEE 600-16 58 11 640-15 54 95 700-15 9 18 75 700 20 911 88 600-16 6 45 670-15 5 25 750-16 8 10 25 750-20 8 10 99 650-16 6 5 45 710-15 9 35 700-17 10-85 828 20 18 52 650 16 6 6 45 750-15 9 45 750-17 12 75 900-20 18 75 700-16 8 25 600-15 9 75 650-20 10-75 1000-20 17 95 750-18 4) 7 45 820-19 6 78 3226 8 10 39 1100-20 17 95 650-21 5.75 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-16 8 75 750-18 4) 7 55 700-18 8 75 700-18 8 75 750-18 8 75 7

EXTRA SPECIAL' Paily Contrasteed all size 4-ply past FREE TIRE with 2 or more of these -W. W. \$1.00 Estra. Factory Tested Tube given, DIAMT TIRE BALE.

STANDARD 834 N. Broad St., Philadelphia 30, Pa.



New! Tiny Size Radio



Listen at work play, to bed Fift shirt pocket.

No tubes No batteries No electric
plug ins No extense Plays day a night forever New self-gamered dinde rectifier re-praces tubes thes short serial for total stations. Tuner con-

ers complete broadcas be Red plastic case on 5 383)

Haring Aid Phone 19 mm in ear, mash colored almost herists a \$1.50.

JOHNSON SMITH & COMPANT, Dept. 637, Detroit T. Mich.

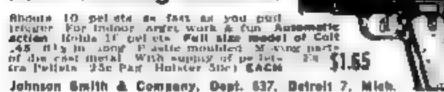
0-F00T BULL



MARO MITTIMAL LOUD CRACK-MAI Laparia brank asters of righ-res Yank people of fort Land by trainers questions, Loud cracket like a Most-gun blast 4-ply hand pla testal leather With basel's loop

4-ft. whip \$1 98. 8 ft. \$2.69. 10-ft. \$3.22 JOHNSON SMITH COMPANY Begt. 627 Petroit 7, Mech.

Pellet Shooting Automatic



Catalog • 3200 Novelties 10c

fand 100 for amazing tatalog of morbition, live animals, action? He supplies habe so, fundahers, planes & beats, leons, magic tricks, jets articles, guarded seeds, god-got timesevers, comeres, aptical guarde, projectors, mories, lucky jewstry, religious pove tree, dispuses, mories, lucky jewstry, religious pove tree, dispuses, mories instruments, themps, of no, surgles, fortuna passes, hacks, ambered gadgets, artists supplies, senting sets, sequine, passes, backers, holives, to Hester, fireworks, guard, rifles, sports, books games, plants, etc. Seeds name address & 100 religious passes, backers, holives, to Hester, plants, etc. Seeds name address & 100 religious passes, passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants, etc. Seeds name address & 100 religious passes, plants & 100 religious passes & 100 religious & 100 r



Hunt small game 10-in, Bolunced Throwing Knife ups Souble edged penetra for point March tibug fuller of for rank Remarks throwing the extense with the point that the forest to rank Remarks throwing the extense with the point the factor to the forest to the factor to the forest to the factor to the fa

POWERFUL ELECTRIC GENERATOR

Cost Over \$20.00 New! White They Last, \$3.05 desprayes Up To 75 Volts. Use to generate electricity to ring botts. High up Highia, as a medical battery deliver fair tic electric shock as yoke. many electrical experiments. many electrical experiments.

constroom uses, etc. Hund, crack or gear
wheel drive Made by leading electrical
companies. Each has done drive with 1 h
bar inaguets, stone worth more from hou
cost general or armstitute with leads fear
rianh trady for use freglenty used in centh
places. Weight over 3 to a Postpaid \$3.95
Johnson Emith & Co., Dept. \$37. Dept. 7. Mech.





FREE

- **OFREE Lessons**
- Music Stand

Deluze Case **CLifetime Guarantee** logs. Leading brands in more than 30 new models Small down payment Easy terms. Trade-ins accepted. Chance of a lifetime. FREE COLOR CATALOG

Learn how easily you may own and play a line accordion. Hugh name and address for big FREE Color Catalog and new law wholesafe price list, No obligation. WRITE TODAY!

ACCORDION MAKIN'ACTURERS AND WINDLESALERS OUTLET 2003 W. CHICAGO AVÉ., Dopt. P-ZB, CHICAGO 22, ILLINGIS



HYPNO Be Popular Entertain Amaze

Learn to apply Hypostism and Automaggertion in short time by training at home Write to America a sidest, most famous Hypnotic St 1000 for free information now lader DON'T DELAY Satisfaction or money refunded. Sent in plate wrapper.

SCHOOL OF APPLIED HYPNOLOGY

Dept. 22

120 Central Park South

N. Y. 19, N. Y.

What Does Your English Say About You?

Every time you speak or write, you show what you are. Poor English can beem you more than you realize A command of effective English helps you socially and in business. You can improve your English through Sherwin Cody's famous patented invention. If you are ever embarrassed by mistakes in grammar, spelling, pronunciation or punctuation, send for Mr. Cody a free book How You Can Master Good English in 15 Minutes a Day " No obligation No salesman will call, Address Sherwin Cody Course in English, 572 Central Drive, Port Washington N Y



Name Address

MASONITE Makes the News



New "dream walls" offer the warmth of wood ... without the work!



Misty Walnut PANELS

How often have you dreamed of the richness, the warmth of wood-grain walls? Only to find they were beyond your budget...too tricky to install...or too much work to keep up.

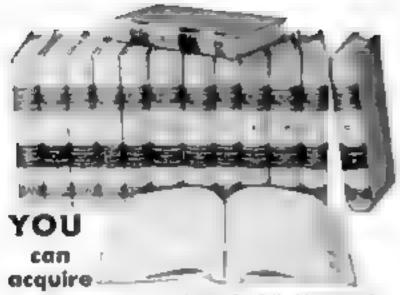
No more! These new Misty Walnut panels bring you all the rich beauty of wood-and without the high cost, either!

Your wall panels go up in handy four-foot widths .. no tedious matching or fitting. Attractive vertical grooves set off the grain, give your wall a custompaneled look. Joints are concealed ... no nails mar the surface.

Once up, your work is done. No sanding or filling. A coat of good paste wax enhances the beauty of Musty Walnut...no chore to keep clean.

Sound like a dream? It is...a dream come true... and it's at your lumber dealer's now. Misty Walnut by Masonite!

Manonite Corporation
Dept. PS-2, Box 777, Chicago 90, Ill. Yes, I'd like more information on the new Misty Wolfast panels, also "Hints to the Handyman," showing me how to work with
Dept. PS-2, Box 777, Chicago 90, Ill. Yes, I'd like more information on the new Misty Wolfast panels, also "Hints to the Handyman," showing me how to work with Masonite® products.
Dept. PS-2, Box 777, Chicago 90, Ill. Yes, I'd like more information on the new Misty Wolfast panels, also "Hints to the Handyman," showing me how to work with
Dept. PS-2, Box 777, Chicago 90, Ill. Yes, I'd like more information on the new Misty Wolfast panels, also "Hints to the Handyman," showing me how to work with Masonite® products. Name



NIGHTS AT HOME! . B. DEGREE

LaSalte's famous Law Library—used as reference in many Law libraries and Law officeshas enabled thousands to master Law surprisingly fast, in spare hours at home, for business and professional advancement.

These 14 remarkable volumes, compiled by leading professors and lawyers, cover the whole basic field of Law in condensed, orderly, sim-

plified manner.

City, Zone & Stale

You advance rapidly with this great library, plus special lectures furnished. We guide you step-by-step with personalized Problem Method of instruction . . . you learn by doing hundling legal problems—not by memorizing rules.

Send for two FREE booklets, "Law Training for Lendership," and "Evidence," answering questions about Law and its value to you, and telling how LaSalle Law graduates are winning rapid advancement in business and public life. Mail coupon below. No obligation.

LA SALLE EXTENSION UNIVERSITY

A Correspondence institution Dept 2831 Chicago 5, Ill. 417 S. Dourborn St.

Send me your two FREE booklets described above. Without obligation.

Name	
------	--

BE AN AUTO-DIESEL **MECHANIC...EARN** WHILE YOU LEARN

Many of our graduates earn \$100 a week and up. You learn fast in our school and shops because you learn with tools on rest equipment. Experienced instructors expisin WHY and show you HOW, then you DO IT YOURSELF One of the best equipped technical schools in the United States. Thirtynine years' experience training men. Successful graduates in 48 states and many foreign countries. Approved for veterans. Day and evening classes. Froe bulletin-write today

NASHVILLE AUTO-DIESEL COLLEGE 226 7th Ave. N., Dept. 42 Nashville, Tuen.



known, for sportsmen Fun, real profits.

FREE BOOK
You FREE React ful Strange,
vanishing Book, for ing all about
Taxing Book, for ing



MEW FREEDOM

of action, prace of mind and AREA AL WARK OF DIRECT PROT en patented MILLER heads your replace back Day and Niga s if bring sou teating relief! He he ned shousands of others!

For FREE facts in plain wrapper Send Name and Address to FRED B. MILLER, DEPT, 3-8

Manufacturer: HAGERSTOWN, MARYLAND



BOOM FELLS

TRATED CATALOG NOW! (Jadiga e) return mak g auton in higher teen. Black and run saur com bustessa tulckir Meh wo nen of mil ages learn es dy fourse rowers Sa es l'emperty Management Appearing the high Michaele and training a series Study at Home of the said for a red subjects Study at Home of the said for the said f

WEAVER SCHOOL OF REAL ESTATE (Bit. 1936) 35206 Grand Ave. Hansas City, No.

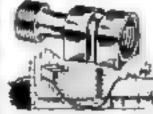
Coast to coast, high-paying jobs in photography are waiting for people with that "know-how" to fill them. You can quickly, enaly qualify at home with the worldfamous NYI Learn - by - Doing Method. Write today for free catalog. Also resident training in N.Y 48th Year Approved for Vets.

NEW YORK INSTITUTE OF PHOTOGRAPHY 10 West 33 St., New York 1, N. Y.

PUMPS 300 GALS. PER HOUR;

Needs No Electric Motor or Gas Engine Power. Lifts Water 6 Ft.

When water gets into your getter or you water to drain not a pass, hat clareto. excavation, boat don't break your bank hand in uping or by the line fast connect your garden have to nearby water ladeet and free end to ptake wife of 849 840Y DRAINLE Connect another length of hose to discharge arte, turn on faucet and SPFEDY DRAINER will pump out water at the rate of 300 gallons per hour



right down to the but on. This precision made, all bruss siplicit Due bound noving parts to wear gain of that it a processes when you need it yet rosts on y \$2 DN posqua I. Plan postal charges if C O D. MONEY RACK GUARANTEE.

MERIDIAN CO., 366 Medison Ave., Dept. D-182, New York 17 i

"THIS WISDOM MUST DIE!"



Truths That Have Been Denied Struggling Humanity

FOR every word that has left the lips of bishops or statesmen to enlighten man, a thousand have been withheld. For every book publicly exposed to the inquiring mind, one hundred more have been suppressed - damaed to oblivious. Each year of progress has been wilfully delayed centuries. Wisdom has had to filter through biased, secret sessions or ecclesiastical council meetings, where high dignitaries of state and church alone proclaimed what man should know

Are you prepared to demand the hidden facts of life? Will you continue to believe that you are not capable of weighing the worth of knowledge that concerns your personal freedom and happiness? Realize that much that can make your life more understandable and liveble has been left unexplained or intentionally destroyed. At first by word of mouth only, and now by private discourses, are revealed those truths which secret brother-hoods preserved in ancient temples and hidden sanctuaries, from those who sought to selfishly deprive humanity of them.

THIS free BOOK OF EXPLANATION

Let the Rosicrucians, one of these ancient brotherhoods of learning, tell you about these amazing truths, and explain how you, too, like thousands of others, may now use them to enjoy the fullness of life. The Rosicrucians, (not a religious organization) invite you to send today for your Free copy of "The Mastery of Life" with its startling tale of self help. Use the coupon opposite or address: Scribe L.O.Y.

The ROSICRUCIANS (AMORC)
SAN JOSE, CALIFORNIA, U.S.A.



Scribe L.O Y
THE ROSICRUCIANS (AMORC)
Rosscrucian Park, San Jose, California, U. S. A.

Please send me your FRFE Book 1 am sancerely interested in learning how 1 may receive these long-concealed facts of life

Name

Address _

DRAFTSMEN



CASH BIG PAY CHECKS!

Train Now for more success. greater security

LEARN AT HOME IN SPARE TIME (or at college in Chicago)

Check the want ads in any newspaper -SEE the logpay opportunities open to you as a draftsman. What's more, you can learn this well-paid, prestige profession at home—quickly cast y' No special talent needed! Get complete, step-by-step Chicago Tech lessons in the mall spend a few pensint hours studying each week. In a short time you'll be a well-trained draftsman ready to take your pick of many good jobs. Act now!



FREE INFORMATION MAIL COUPON TODAY!
Get PREE TRIAL LESSON plus information about CTC practical training Learn what successful Chicago Tech grac lates my about high poy and opportuntiles in drafting. No charge, or obitgatten

Now added to our

great line of kits,

new easy to os-

semble Lapstrake

Shoffs

CHICAGO TECHNICAL COLLEGE

B 226 Tech Bidg., 2000 So. Michigan Ave. Chicago 14, lifinole Mail me FREE Lesson with information about his opportunities in DRAFTING. · · · ARP· · · ·

AK-IT BOAT KITS



30 years of boot kit pioneering 30 models Prams, Row boots, Outboards Cabin Cruisers and 5k ffs

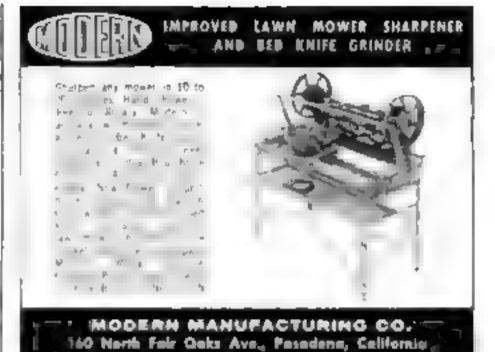
SEND FOR ILLUS, CATALOG

Showing all models from B' to 23" Const delais, points, access, etc. A you need to build your own

MAIL 35; (coin) for Postage & Handling.



DELAND, FLORIDA, DEPT. 31



Print Your Own

Cards, Stationery, Advertising, Circulars, labels photo and thovis titles, thursh work, tory only Raused printing sike engraving, too. Own a Printing Business

From the there and I st the home show Juntor sees 5.5 Senter \$20 up We so by execution large for few children of our Standard states and all details.

KELSEY PRESSES, C-33 Meriden, Conn.

DOUBLE-BEARING EXCLUSIVE HEAVY DUTY PUMPS

HREIGATE & DEATH & CHECKLATE & SPEAY

Up to 7 500 GPH. L 000 GPH SO https: or 0 min dPH

from 23' well. Use Lo to 1 MP motor 146" niet 1"

these to fit pet to share TYPE 2 2 bit test \$10.95

heat for bell drives

Postpred of such with prior.

Deat's drive-read for yours ladge!

Money Back & WARANTEE

Contribugal and Gase Pumps in All Signs

LABAWCO PUMPS, Balle Monel 4, N. J.

EXTRA MONEY PART TIME!

SELL FAMOUS DOUBLEWEAR SHOES TO FRIENDS, WEIGHBORS, CO-WORKERS!

Fall of p dryes sport work shiers for the proof for fast sales some or lest fill local males and for the proof of the proo

DOUBLEWEAR SHOE CO. Dept. 36 Minnespelle 8, Minn.

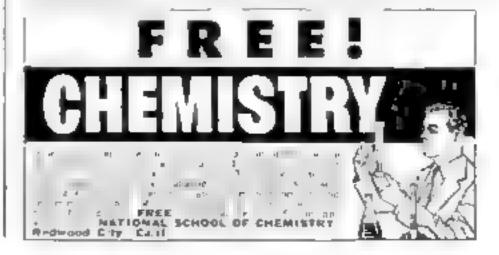


2 FOR \$14.95 MAGNETO HANDSET INTER-COMM

(rebuilt) For house to burn etc., included 100 ft. of were and 4 batterses. Additional wire. Die per St. Any number can be connected in same line. Write for FREE List, All Shipmonts FOB Einspeen. Pa

TELEPHONE ENGINEERING CO.

Simpson, Pa.

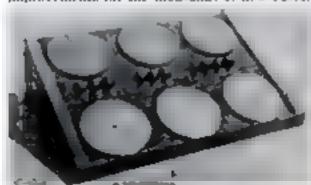


WE DON'T NEED ENGINEERS

. . . but they write to us daily to order our GENIAC(8) Electric Brain Construction Kits.

So No TEACHERS STIENTIFIC ASIATEURS INDUSTRIAL FIRMS and schools See 1.4) he ow 1
THOUSANDS OF SATISFIED CUSTOMERS have Sought QENIACS on a 7 DAY REFUND guarantee

We are aroud to offer our tube Model with up to the mirate improvements for the thousands of new customers who can use them



WHAT IS A GENIACT

State is a picture of the I do Model (ENI St In the dispuny rack \$3.00 separate at which termine with every hit CFN(Af stands for forming Serial Automatic Computer A h I of specially distigned on teledrate and make which permit the user to consider a property of the constitution of the constitu

4

ш

۵

ш

Q1

۵

ш

I

ΟI

•

wiring diagrams and us duny more to be to able to design bifuself. These machines demonstrate the applications of electronic electronic contents.

APPLICATIONS OF GENIACS

RIMPIE COMPUTER (III TITS for hisney deems add at subtracting dividing majority machine such sea. PhOBI-5.55 to entirely sufficient comparing. INVOSCOLOR | AL TENTING and PAPE WENT (ARE PLAY ING CIRCUITS for to tatiget and sum. AFTE SHANE ANALYSIS.

SOME OF OUR CUSTOMERS

Alits-Chalmers & Remington-Rand & International Replants Machines

Manuel Missionary College & Samard College & Westinghouse
Electric & Phillips Laboratories & Convest Insurance Co. of America

E Lafayette Radio & Rose Aircraft Co. & Aibert Einstein Medicat College & Naval Research Laboratories & Soard of Education. Tecumbeh
Nebrasha & Los Angeles Public Schools & Jefferton Union High
School & Oklahoma A & M. & Gourtland Jr. High School & Bell
Telephone Laboratories.

Telephone Laboratories.

WHAT COMES WITH THE RITE

BOOKS-1. SIMPLE RECEIVE REVINA, AND HE WED STARP THEM

64 page experiment mesons - NOW 2 M NIM AND MALLIDES

100 tage text of computers automation and expensive - NOW 2 WISH

1NO PLACHAMS for best GENIAL clerities NEW 4 Beginners Manual

for the person who has belie as form in the secretic circuit a NEW?

6 TANIAC study guide — the equivalent of a fail comme in computer

Condenses, as a loss additional readons

PARTS-PANGLE TYPE RALK for each mesorably had display Hardmars, were tools, but tray, better ste for cours than thirty mark new

RENTS for your GENIAC gase At only 112 M, a hargain coping complete

with aver diff parts and empresses a hashe and manual We can have re
lint if you do not want to keep GENIAC after one week you can return

it for full refund Add SOC west of Miss. 33 surside U.S. Majt Rame & Address with Stock or Money Order to

OLIVER GARFIELD CO., Inc. Dept. PS-28 126 LEXINGTON AVE.

not everyone does as well, but E. O. Lockin, who started a business of his own, reports...

for 12 months ve averaged most af li slear prafit for mel

Many men have discovered how to be independent, to be free of bosses and layoffs, L. A. Eagles grossed more than \$200 his first week. Others report gross up to \$12,000 per year, How much you make depends largely on you. You need no apecial skill, no large investment.

No shop nocessary. Our ELECTRIC RUG WASHER cleans rugs, carpets right on floor . helps to show their natural color, beauty So efficient and safe, used by largent hotels and railroads.

You take no risk. Machines guaranteed Write full information including how to make hig profits in YOUR OWN business



MAIL COUPON TODAY FOR FEET GOOD

YON SCHRADER MEG. CO., 211 "4" Pl. Buche, Wis.

Without obligation, send your FRRE booklet containing information about your BLECTRIC BUG WASHER and how I can start my own permanent, profitable business.

Name	

Address Zone___Stote Special Opportunity Check-List

TEN MOST-WANTED MEN

The ten Engineering Technician classifications listed below are those which currently offer you the greatest opportunity with a minimum of special training.

Find out how you can qualify for one of these interesting, vital. high-pay jobs. The I.C.S. method makes it possible to prepare yourself while holding down your present job and supporting a family. For full details at no cost or obligation, tear out this check-list, mark the opportunity that interests you, and mail it to International Correspondence Schools, Scranton 15, Penna.

	Aero-Engineering Technician
	Chemical Lab. Technician
	Electrical Engineering Technician
	General Electronics Technician
	Industrial Electronics Technician
	Aircraft Draftsman
	Electrical Draftsman
	Mechanical Draftsman
	Petroleum Engineering Technician
	Radio-TV Technician
or a	omeAge

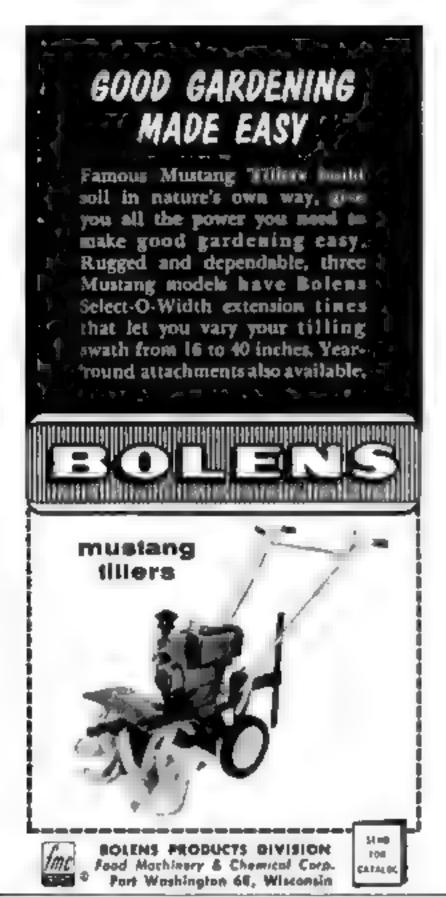
Working hours______A.M. to _ Mail to:

Home address____

Present occupation

INTERNATIONAL CORRESPONDENCE SCHOOLS Bax 55314B, Scrapton 15, Pouna.

_Zone____State __



You can make money in

Learn at home the low cost Sweazey Way

Watch repairing pare up to \$6 an hour part time watch makes seport on a rrey I note and modern Sweazes home study by dom starts yet. making repairs right away on Swiss and American watches, Profesclustry prepared training. No previous experience besied Special to in provided for practice. Tuition only 35 a month. Free sample lesson and opportunity book give all facts, Write today. No obligation.

CHICAGO SCHOOL OF WATCHMAKING 2339 M. Milwawkee Ave. Dept. 428 Chicago 47, Illicols

FREE BO	OOK and	SAMPLE LESSON
CHICAGO SC 2110 N. Milw	HOOL OF WATE	CHMAKING 428, Chicago 47, INfinels
Please rush 3	TREE BOOK and	Sample Home Study Leason.
Address		
	** **	

BE A COMMERCIAL

Prepare for a fascinating, profitable Art Career this easy, proven way One "low-cost" teach yourself course covers Illustrating, Cartooning, Lettering, Oil Painting, TV Art, etc., Plus TWO ARTIST OUTFITS at no extra cost. Cash in on demand for trained artists. Be your own boss or high pay staff artist. FREE BOOK describes our easy method, opportunities in art. No obligation, No salesman will call, Just send your name, address WASHINGTON SCHOOL OF ART, Studio 151, Port Washington, N. Y. (Batab, 1914.)

VIII training leads to success as trebulcians, field engineers, specialists in communications guided mastes compagers rater automation Basic & advanced courses in theory & interactory Assoc degree to 20 mon B S of an autote Et Pf) according to I approved traductes with maste companies Start Sept. Feb. Dorms, campus. H. S. graduate or equivalent tables.

VALPARAISO TECHNICAL INSTITUTE DEPT. PE VALPARAISO, INDIANA

FREE-U.S. STAMPS

U. S. 1943 Bi-Colored Flag of Occupied Nations (as illustrated) Airmans. Commemoratives, Regular Jasues included in this collection of 25 selected, all different, genuine U.S. stamps, PLUS VAL-UABLE U.S. \$5.00 STAMP, Everything for 10c to sever



mailing expenses. Approvals included. Act at once.

WILLETT CO., P.O. Box 336, Bopt, 686, Yorktown Holykts, N. Y.=

FOR SELF OR RESELL FOR BIG PROFITS! NAME

BEAND APPLIANCES, TOOLS, WATCHES, CAMERAS, PHONOS, SEWING MACHINES, JEWELRY, HOUSE-WARES, SPORTING GOODS, TYPEWRITERS, ETC.

GET OUR BIG WHOLISALE CATALOG OF OVER 2,000 PROFIT MAKING ITEMS POSTCARD BRINGS DETAILS FREE! MAIL TODAY

DISTRIBUT

Find It...with a GOLDAK Transura Finder, Send for FREE literature on compieta line of mineral & mutal locators, underwater datectors, etc., priced as

few as \$64.50. In celebration of its 25th year, 6010AK CO. introduces new transister instrumonte for greater consitivity - luxu weight - low cost flashlight hatteries.

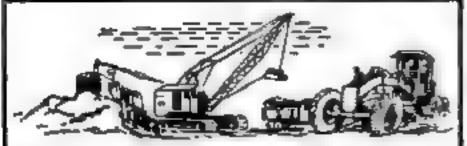
Write for information today! GOLDAK CO. BLENDALE CALIF.

CTROMIC AND AERONAUTICAL

Northrop Institute in Southern California prepares you for highly paid positions in Aviation and Electronic industries. Employment assistance during school and after graduation. Approved for Veterans.

Write today for FREE CATALOG

NORTHROP AERONAUTICAL INSTITUTE 1157 W. Arbor Vitao - Inglewood 1. California



Make big pay in the construction industry us an operator of Buildazers, Oraglines, Shevels, Back Hoss, Scrapers and Meter Graders. Learn these skills NOW! Mackines of major tnanufacturers are used in our training program, Contractors need operators of earthmoving machines and pay high wages to our productes. Den't be satisfied with just a jeb . . . learn a corner!

> VITERANS: Ask about G.I. Bonofits Write TODAY for FREE School Catalog.

> > no obligation, to either address.

National School of Heavy Equipment Operation P. O. Sex 2243, Dept. A-7

Charlette, N. C.

Western National School of Heavy Equipment Operation

P.O. Sex 517, Dept. A-7 Welser, Ideba

Anding them



PRISMS

VOLUME SALES CO.

2030 Surper Blvd , Dopt PS-256 LOS ANGELES 28 CALF.

Are Those Crusts and Scales



NEW BOOKLET mast-asked questions about eseriesis.



Please Print.

AT ALL DRUG STORES

SIROIL LABORATORIES, INC. Santa Monica, Calif. Bogt, PW-AN

Please send me year new FREE booklet as PROUSASIS.

ADDRESS.

STATE.

Complete Training

... AT ONLY A FRACTION OF THE PRICE YOU MIGHT EXPECT TO PAY



LEARN ELECTRIC (INCLUDING COMPLETE REPAIR

REWINDING)

hearn for good pay in this uncrowded field! Learn at home to service and rewind practically any electric motorfrom home appliance motors to by industrial motors and general is and their control equipment. This 560-page ELECTRIC MOTOR REPAIR golde explains every step by text and ALSO by more than 800 how-to-do-it pictures. Quick guider show how to handle specific jobs. When A

certain motor comes for repair, just look it up. FLECTRIC MOTOR REPAIR shows you exactly what to do Right down the line, it explains troubleshooting, report, rewinding and other matotenance in a way you can understand even without a lot of previous electrical training. Price only \$6.95 separately, but see money-saving offer in coupon Moneyback guarantee.

LEARN ELECTRIC APPLIANCE REPAIR IANY MAKE OR MODEL)

This 370-page Rinchart ELECTRICAL APPLIANCE SERVICE MANUAL shows you how to do the toughest fepair jobs as well as the easy ones even if you've never fixed an appliance before. Gives specific instructions on evrry modern appliance. Includes refinishing methods. Handy charts help you locate troubles fast. Supply lest instruments you can make yourself are explained. Tools, wiring problems and electrical principles are fully described Gives you the "know how" you need to earn spare-time money fixing appliances—or, to build a full-time repair husiness. Only \$5.00 separately-or see money-saving offer in coupon

SPECIAL OFFER . . . you save \$1.001

If written in "lesson" form and sold as a course, you'd regard there two great books as a bargain at \$100 or more! Together, they form a 930-page electrical repair library that makes it easy to train for this good-paying modern profession. Under this new offer, you save \$1.00 on the regular price of the two books. And you can pay in easy installments while you use them!

ETHE MHILE AOO TEVEN!
Dept PS-28, RINEHART & COMPANY, INC. 232 Madison Ave., New York 18, N Y ELECTRIC MOYOR ELECTRICAL APPLIANCE REPAIR (\$4.95) MONEY-SAVING OFFER—Save \$1.00 Send both books at special price of only \$10.95 (regular price \$11.95). Payable at rate \$4.95 after 10 days if you decide to keep books and \$3 per month for 2 months. (\$AVEI Remit price with order and we pay postage. Same 10-day rature privilege with mency refused.)
Name
Address
City, Zone, State.

AUTOBIOGRAPHY



PARAMHANSA YOGANANDA

> A Spiritual Classic

"These pages reveal, with incomparable strength and clarity, a fascinating life, a personality of unheard-of greatness. The author undertakes the unique task of instructing the Western reader in the practical application of yoga, setting the example in his own life ... in these pages is undeniable proof that only the mental and spiritual striving of man has lasting value. and that he can conquer all material obstacles by inward strength... We must credit this important Autobiography with the power to bring about a spiritual revolution." Schleswig-Holsteinische Tagespost, daily newspaper of Germany.

SELF-REALIZATION FELLOWSHIP

(Depr. AP-2) Los Angeles 65, California



Militians done (10 Cen YOU Also

FAIT Florin Book

of Strong Man

Stop being **SK**1 Quickly GAIN 25 LBS HANDSOME POWER - PACKED MUSCLES IN 1 dd

Sand for these 5 AMAZING PICTURE COURSES ALS FREE before \$1 price goes back

1. Now to GAIN MIGHTY ARMS

2. Now to CAIN A DIG CHESS

How to GAIN A MIGHTY BACK

4. How to GAIN POWERFUL LEGS

5. How to GAIN A GRIP OF STEEL Send 10e for postage for all 5 items

Jowett Institute, Dept. PS-82, 220 Fifth Avenue, N.Y.11, N.Y.

Straight, curved, single or double With any color paint stripe furniture, butes, autos, model places toys linesum, wall-board Coran, crisp decorative lines Can't closs or unear. Also use with glue, tempera, textile paint or undergiaze on wood glass plastic, ceramics, metals, fabrics and paper Ask your dealer or order direct.

DEALERS HOBBY "Professional" striping tool results every esrton Write easy to use

Ask about heavy duty industria) atriping tools

for discounts | Order now BOUBLE STRIPE MODEL \$225 COMBINATIONS.



Entra 1/4" No..\$1.20

stripe models

Other single \$175 trine models | 176

1 16"

stripe model

5¶25

\$254 binnings ave., Oct., 210

OH, MY ING BACK

Now! You can get the fast relief you need from magging backache, benduche and muscular aches and pains that often cause restless mights and miserable tired-out feelings. When these discomforts come on with over-exertion or stress and strain-you want relief-want it fast! Another disturbance may be mild biadder irritation following wrong food and drink-often setting up a restless uncomfortable feeling.

For quick relief get Donn's Pills, They work fast in 3 separate ways. I by speedy pain-relieving action to ensetorment of magging backache, headaches, muscular aches and pains, 2. by their southing effect on bladder trritation. 3, by their mild diuretic action tending to increase output of the 15 miles of kidney tubes.

Find out how quickly this 3-way medicine goes to work, Enjoy a good might a sleep and the same happy relief millions have for over 60 years. Ask for new, large size and

save money, Get Donn's Pills today !



Write, Draw, Decorate QF In Genuine 23 Kt, GOLD ON PAPER, LEATNER, PLASTIC,

WOOD, METAL, GLASS, ETC. With GOLDMARK, you can autograph wallets books etc. in sold Personalite

Goldi

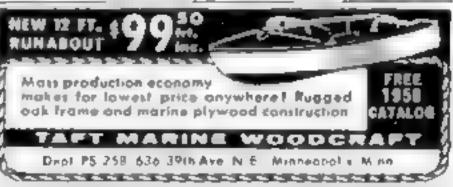
Strip

tools sports equipment in 23 kt gold Make tools sports equipment in 23 kt gold Make gold signs, decorate in gold Thousands of uses. In Quick Dispenser

At Stateonery Variety Art. Hobby Stores or Order From:

STENSO LETTERING CO. Balto, 18, Md.





GOVERNMENT OIL LEASES LOW AS \$1 PER ACRE.

You do no drilling, pay no taxes, may realize a king-size profit without ever leaving home. Write for free map and literature.

AMERICAN OIL SCOUTS, Dept. PS

7321 Beverly Blvd.

Los Angeles 36, Calif.



Genuine Dupont Plastic

NO DAPRESSIONS NEEDED enerr Dupitear in Perchan System actuarly transforms rust and inner, cracked, chipped plate abto a new natural plate with some halura material tech or new things matche tech ONF DAY SERVICE your name and address for



MONEY

our law price. Highest prices puld for Dental Gold

FREE: 6 months' supply Faise Plate Cleaner to

ALL STATE DENTAL LABORATORIES

22 W. Madison

Dept. 217

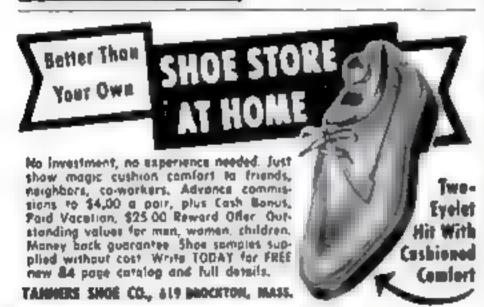
Chicago 2



More Colorcretors are needed to supply growing demand for the enduring, colorful beauty possible only from Colorcrets. Time-worn concrete, stucce and other old or new massary walls are quickly transformed into clean treshness from a selection of 30 tints, tones and shades. Comentitious base—tough, tenacious, enduring. Colorcrete is applied under pasumatic air pressure by authorized Colorcretors, Machine in easy to operate and readily mobile. Opens up opportunities for men of modest capital. Broad markets with high income potentials. Write for Opportunity Book.

COLORCRETE

COLORCRETE INDUSTRIES, INC. 572 Oneus Ave., Helland, Mich.



ENGINEERING B.S. DEGREE IN

DEGREE IN 27 MONTHS

APPONAUTICAL, CHEMICAL, CIVIL, ELECTRICAL, MECHAN-ICAL and ELECTRONIC ENGINEERING (Inc. Radio and TV)

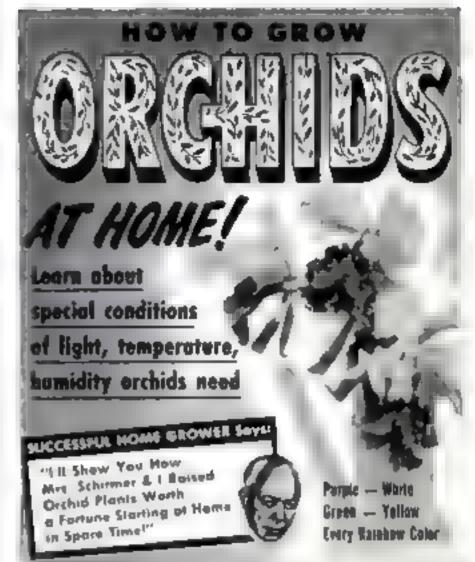
Abso H S DECREDE in '20 no. in M. thematics of hometry Physics for all age No year Physics. Engager of Solvene preparatory courses. Thosough, practical program indisjointhese instruction on phasized, the employed approved for Q 1 s.

Keeping pace with progress in science and angineering

Specialist campus 20 but it as domatories grammation Curring field. Morein well equipped laboratories including new plants about and which improve Low tastion. New terms start quarter a laboration Manual for grantantes. Manual for grantantes. Students from 12 states and 40 toreign or above. Many earn a major part of their college expenses in this large industrial center Send coupon for free entaking and full information. Entail now?

INDIANA 1	TECHNICAL	COLLEGE
-----------	-----------	---------

INDIANA I CONNIDAL COLLEGE D
628 E. Washington Boulevard, Fort Wayne 2, Indiana Fleeze send me free information on 27 Mo. 8.5, DEGREES (as Aeronautical Chemical Chemic
Name,
Address



Infilling HOBBY Imagine the delight of watching gorgeous Orchids hard into radiant bloom—to be supped from from the plant for premons coranges, for gifts, at to sell at fine profits! Big lavender or white Cattleys Orchids like those sold in every flower shop exquaste Cymbidiums often 25 to 30 flowers on a stem. Dozens of others Many Orchida grow without soil, getting food from the air

PROFITABLE NOME BUSINESS. So harmon Course in many laste to many her that has for possiting and in the form forward own top into even a form. Bug processoral demand form individuals, flutters, hotels, etc.

At those soid by mod order Learn how Orchide multiply - one plant may become many, each valuable as the first. No big investment. Takes only few minutes a day

maciy, (nyostin

Hundreds of Families Brawing Orshids of Hon

> COMPLETE INSTRUCTIONS AND WEAL ORCHID PLANT —YOURS TO EXAMINE AT HOME DEFORE YOU DECIDE!

Most enjoyable habby I hape People draws 100 miles to see this plant-10 flowers, 815 across.

Thomas Hurst, Utoh

"I self many blooms, and have I really started yet Own my execute to the Schimers."

Mrs. Frank Harwood, Dre.

"I have standing orders for future flowers. Will always be grateful to you."

Mrs. Subset E. Lou, Ohio

Negaty 300 pages of Instructions - the "Know How" of the experts - in simple language jam-packed with 'above-how" drawings and photographs many in natural color Reof blooming size Orchid Plant included in easie shipment with Course. All for you to examine at home - No obligation to buy a thing unless you wish. FHEE Tull details SENDINO MONEY Just name 4 address on Coupon or post card Write today Airman is quickest.

TROPICAL FLOWERLAND Dopt. 23-A 100 S. Vermont Ave., los Angeles A. Celli

	MAIL COUPON NOW!
AN A	Plant and sp. name Quek 27 dis Plant Andrew Plant will include a Constant of the Constant of t
Name	.
Street	
Топр	Zone State



I'll Set You Up For Life In Your Own BIG PAY SHOE BUSINESS

Up to \$32.00 a Day \$480.00 a week to so trick at all to Demonstration

TIME with America a

aboes Amazing new Spring Step cushion design proves it by actual demonstration Only ORTHO VENT has it No other shor in the world like t Profits are BIG—repeat orders are sure and easy with amazing I minute demonstration. No experience needed No investment to make Everything furnished free including freet sales outfit and actual demonstrators. Be the big-pay ORTHO-VENT man in your territory Send Today for free out-

ORTHO-VENT SHOE CO.

Amoring 2-MINUTE
DEMONSTRATION
Does Your Solling
Job for You
FAST I

FRODUCERS
THEIR OWN SHOES
AS A BONUS!
482 Brand Road
Salem, Virginia

MAIL ORDER Opportunity!

START FROM HOME....SPARE TIME work at Minds work at work at work at most at motion member of intelligent men and women to work at me in an analysis mell order business proposition. He selling—we take an analysis including literature, names, addresses, pinck and ship as for you. All you do it mait for us and massive money coming by

1526: Smith Grandway

Best # 2

write: MEAN, ORDER DISTRIBUTORS (Franchise Birming)

ses Angeles &1. Cald.

PILES

If you suffer from the miseries of itching, bleeding or protruding piles, you may have a generous supply of Page's

Palliative Pilo Preparations absolutely free for the asking. They have relieved pilo suffering in hundreds and thousands of cases for more than 50 years.

FREE Trial supply to quickly prove all this, will be sent absolutely free and with no obligation to buy now or later. Send name and address for free trial TODAY! L. R. PAGE CO. Dept. 4381 Mershell, Mich.

CABINET MAKING

LOW COST HOME TRAINING COURSE FOR REGINNERS & ADVANCED CRAFTSMEN

Make money. Learn skills and secrets of fine woodworking and tool use. Professionally prepared shop method training tells and shows

Write for

INTERSTATE TRAINING SERVICE

DEPT. F-2, PORTLAND 13, OREGON

NVENTIONS WANTED!

140 Wealthy Manufacturers Ready to Pay Top Prices

Do you have an idea for a new product or a way to improve a product already in use—patented or unpatented—you would like to sell for cash or lease on royalty? If so, send your name and address on a post card—NOW—for FREE details explaining how you can turn your "Big Ideas" into big money.

SCIENCE AND MECHANICS MAGAZINE 450 East Oblo Street . Dopt. 182 . Chicago 11, Illinois

NEW RUBBER STAMP BUSINESS PAYS BEGINNERS #5 9.20 AN HR.

START AT HOME
IN SPARE TIME
with Table Top Machine!

The multi-million dellar Rubber Stamp business - once controlled by a few big companies—is now being taken over by small operators—one in each community throughout the United States. Men and Women who have this inexpensive machine can turn out huge quantities of Rubber Stamps with special wording that buyers once were forced to buy from big cities. Material coeting only 27c makes a stamp that sells for \$1.80. The machine that does the work is simple and easy to operate and it turns out as many as aix Rubber Stamps at a time, each with different wording such as names, addresses, notices, stock numbers, prices and other "copy" needed by offices, factories and individuals. Working full capacity, it can earn as much as \$9.20 as hour for the eperator! Now you can get into the big-pay business yourself, with your own home as beadquarters. You don't need experience. We supply everything, including complete instructions and eight ways to get business coming in fast, Start making up to \$9.20 an hour from the very beginning. Cash in on the profitable Rubber Stamp husiness in your community, right away. We'll mail full perticulars FREE and no salesman will call. Be first in your locality. Rush coupon today or send your name on postcard to

RUBBER STAMP DIV., Dept.R-3-B



ADDRESS

STOP FAN DRAG!

with the NEW FAN-O-MA

Automatic FAN RELEASE

Makes fan a free-wheeling unit at speeds over 35 MPH+

INCREASES

- Available Herespower up to 20 H.P. at cruising speeds.
- Ges Mileegs up to 3 miles per go fon . , by actual road tests.
- Acceleration up to 10% official tests conducted at Indiangoons Speedway by J. S. Auto

REDUCES

 Engine Noise, Vibration for amouther, quieter riding.

Simple to install. Adaptable to most cars 🔏 Installation Instructions with every unit

*Enolly adjustable to higher or lower speeds



AVAILABLE et Auto Duelors, Garages, Service Stations. Manufectured and Guaranteed by

Radiator Specialty Co., Charlotte, N. C. 🛳

In Conada Radiator Specially Co., Ltd., Torordo

ENGINEERING



Enroll Now for New Yorm

Hoold College Ranks F1R5T

West of the Massacippi

in "Who's Who" in America

Send for FREE Information

Heald Engineering College

Ert. 2842

You Nose at Past, Bapt. P.S. 158

San Francisco, California

Steps Up Its Demand for Trained Engineers. Train Now at Healds

American Industry

BACHELOR OF SCIENCE DEGREE. **27 MONTHS**

Electronic Engineering Electrico Engineering Highway Engineering Mechanical Engineering Structural Engineering Civi Engineer ng Architecture

Diploma Coursess TELEVISION [Color TV Industrial Electronic

Tech Tool & Die Design Architecturas Drafting Mechan cal Drafting Structural Drafting Surveying Estimation

Muster Electrician Approved for Veterons

STREET __ STATE __



Creat opportunity for a good job or your own business in one of America a fastest growing industries! New stations new ser by the millions Color TV . air means greater opportunities. Dew cets

Veterant and Non-Veterant—Det practical abop work plus techainal training in TELEVISION-RADIO at Coyne in Chicagoold astablished school—training background nearly 50 years, Learn on real equipment—to advanced education or previous experience needed. Lifetime employment service to graduates. Pinence Plan-New theralised credit terms Euroll now, pay most of tuition rater. Part time employment help to students.

BIG FREE BOOK Mail coupon, No obligation, No salosman will call. Act NOW.

Address

CHARTENED NOT FOR PROSTY
Established 1899
BOO B. Pauline, Chirago, Dept., 25-48

COYME Electrical School 500 S. Paulina St., Chicago 12, III., Dept. 28-48

Bend FREE BOOK and details of your training in TV-RADIO

Name

Olty. Bists

PAINTING TIP NO. 42



Make professional-looking stripes with "Scotch" Brand Masking Tape. Stretchy tape sticks tight, hugs curved surfaces. Paint will not bleed through. After paint has "set", "SCOTCH" Masking Tape strips off easily, leaving a clean, sharp edge. Makes painting quicker, neater with brush, roller or spray. Get "Scotch" Brand in the handy cutter-edge carton-35é, 69é, 98é, \$1.69-wherever paint is sold.

Don't run short . . . BETTER BUY TWO!

Made by Minnesoto Mining & Mfg. Co. St. Paul 6, Minn. o 3M Co., 1958



L BRINGS YOU \$

Discover Flek-Kraft and Earn \$5555 AT HOME

The up to 8.5 the per hour space time Amazing new Velvet-fiber spray instantly makes any object (Lamps Hadio & TV Capiners Pigurines Signs Auto desh boards, toys furniture draperies spything worth expensive \$8555 Prices like marke you can sermy shorth me with this beautiful new suade-

EARN UP TO \$300.00 PER WEEK SPARE TIME

imagine, waterials cost only 3c per bluare foot (Average TV or ratio cabinet can be beautifully sprayed with this martong new 3-dimensional Velvet finish in 15 minutes at a cost of only 34c in materials. Four charge for this 300 is at least \$10.00)

REPRESENTATIVES IN YOUR AREA URGENTLY NEEDED

Own your awa business. Work at home in your space lime Help all the home growers demand for this amazing new beautiful Velvet aber and a Orders come from stores offices, homes, as chieces auto desives everywhere Possible 1 0 000 000 000 worth of jobs to be done investigate today—be first in your # hew

Actual samples in 16 Redient Colors. Booklet of 80 Home Bust free Opportunities and Confidential Details all sent free! Writer Goest Industries, Los Ameeles 61, Catif., Dept. A.Z.

200 Miles per Gal. + 60 M.P.H. NO MONEY DOWN - 2 Trs. is Pay



From ber Мα Never before at

this low price

53 MOTOPCYCLETTE made by Gormon PANTHER Pactory FREE BOOKLET " A 2 Denter 00v

CORP.

"Bladder Weakness" worried by (Getting Nights or Bed Wetting, too frequent, burning or itch-ing urination) or Strong Smelling, Cloudy Urine, due to common Kidney and Bladder Irritations, try CYSTEX for quick help. 30 years use prove safety for young and old. Ask druggist for CYSTEX under money-back guarantee. See how fast you improve.

From New York on Jan 1st TWA's Jetstream Constitution flew the man a user a own and let Twa's Jethtream Consistation flow the man a user a own eastward round to far off Earghest and in to Manilla then NWA = 10 % continued the flows in Beautie and New York thus come, which a new Armai Route Around the World You can have a cover flown in the first flight of this new could for out; \$00 or send \$2.50 for a group of 10 all inflerent First Filight covers. Manay back if not completely each sign, Ask for our lists.

K. M. WALSH

Box 306-F

TUCKAHOE, N. Y.



b

Œ,

Factory-wired \$15.75

the same that I detail made without a secretar attended without to the planeter bacates agreets in irons, fans, refrigerature mixing, gurcumpitaning, TV & ratio balan and parts, hottories, generators, six Copy legitimises Com day introduchan to stock-early & processories to currente expans julies. Examing \$160/y sampless P5 & not of the processorate incompanies & title — throughout for FACE Catholic

- Electronic (ostrument Co. (nc., 5) 00 Horsey Old .1).C 1. W T



Get your FREE copy of Split Level Homes ook (value 50c) FREE with your order for the 3 targe Carlinghouse Plan Books described below

These books show hundreds of new plans (or quetom by it?) homes. All sizes and siries petited in the photos and colored drawings. Fore than and accuran description of each plan. Suburban. (3) plans most templete work as plans.

• Nomes in Brick. Many of these In-brantiful tested designs are in [9]

Watch & Subprison, 231 plans most templete working plans, precifical for town and country. Many is recifications, lumber and mild that are lightly for corry plan of LOW CONT wantiful tested designs are in [all the book and of posterior to or 1.00 plans which there is no or the country plan of LOW CONT.

William Wilson Moreon, 116 of our most the services a largest home.

Place Printers Mornes, 116 of our printer disk gas 15 on full relies 30E

polenia premiera L. F. GARLINGHOUSE CO., INC., Dex PS-26, RANSAS

NEW! MODEL 400 SIMPLEX Lawnmower Sharpener

Many Exclusive Features . . .

The NEW SIMPLEX is the fastest, most accurate straight-line lawnmower grinder ever built . . . gives you all these advantages:

- Grinds off mowers—real type, retary, hand or power, any size.
- No dis-assembly needed, gas and oil remain in engine, support bar rotates,
- Grinding head feeds both horizontally and vertically, turns 90° for bed knives.
- Fast, positive adjustments, 4-point support on steel base with leveling screws.
- Rugged, long life construction and many other features.

THE FATE-ROOT-HEATH COMPANY

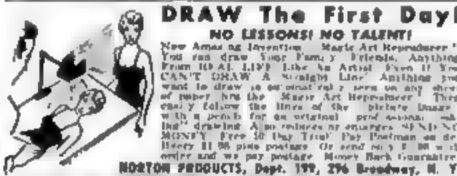
Dept. PS-2 • Plymouth, Ohio



Small investment

Get the facts on the new Simplex 400 before you buy any sharpener.

Send for free brochure today!



DRAW The First Dayl

NO LESSONS! NO TALENT!

New America Invention Marte Art Reproducer "
You and draw Yook Farm y Priciple, Anything From ID Al. Libr Libr he Artisle From IT You want to draw to optomatically person on any object of paper her the Marie At Reproducer Theorem y follow the library Art Reproducer Theorem y follow the library of the picture Image with a pensile for an ortainal personal making drawing Artisley Americans of the library I and the posture of the picture Image with a pensile for an ortainal personal making drawing free 10 that True Pay Postures on the library II 36 pints posture Morey Back Courtains

FREE BOOK

Write today for a FREE cupy of lilustrated law took, "THE LAW-TRAINED MAN," which shows how to earn the professional Bachelor of Laws (LL B) degree through home study of the Ingous Hischstone Law Course. All necessary books and lessons provided. Moderate cost, convenient monthly terms. Write for FREE law training book today.

Blockstone School of Law, 307 N. Michigan Ave. Dept. 124, Chicago 1, Illinols

CUTTING

NATIONAL Pay After Graduation



The steady dependable trade of Meat Cutting taught easily in 8 short weeks, YOU LEARN BY DOING under actual mear market conditions in big modern school at Toledo.

For beginners or men with experience. Get a profitable store of your own, Remember, PEOPLE MUST EAT! Big pay jobs, Free employment help, Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education, National School established 35 years. Get National training NOW. Pay your tuition in easy weekly payments

after you graduate. Send coupon for FREE 52 page school catalog - TODAY, G.I. approved.

Dept 51 A.	of of Many Cutting, Inc. relede 4. Onle	
Send me at Toledo in M Ments. No é	er FREF school cale of hit Cutting, Ment Merch Lighton. No selecting w	on National Training at andising and Belf Service
		
Address	***************	***************
	Approved for training Kor	ruon Veterans

EARN MORE-LEARN TO BE AN

- AUTO MECHANICS DIESEL MECHANICS MODY & FENDER REPAIR GAS-ANC WELDING
- EFFEIGERATION AIR CONDITIONING

 BOAST TEINISSAM ADVANCED MACHINIST
- TIANO TONING & MEPAIR

Skilled man are needed in every part of the country Earn top pay in established shops or start your own mainess. Oreer's expert instruction and actual shop training teaches you how You learn by doing—quick.easy courses using the intest tools and equipment. Day, evening and part time instructions available

Job pincoment and convenient living accommedations are yours while training Contact GREER 8 FREE JOB PLACEMENT SERVICE when you enroll if you wish part time or full time employment.

DESCRIPTION OF THE PARTY OF THE PARTY.

OTESEL AUTOMOTIVE ENGINEERING 27 MGS. REFRIGERATION & AIR COND. ENGINEERING 18 MOS. WELDING ENGINEERING 18 MOS.

All Caurses Approved 🔲 Civ. or 🔲 6.5.

Please ruch me free literature on Auto Mechanics, or on the trade indicated, at no obligation.

NAME. AOR.

O'TREET.

TOWN_

ZONE STATE

Established 1902 EER SHOP

Box B, 2238 S. Michigan Ave. FFFFFF Chicago 16, Illinois FFFFFFFF

=EARN EXTRA MONEY= IN YOUR SPARE TIME ... AT HOME

New Plastic-Fiberglass Process

opens up excellent opportunities you like to work a thines ideas and materials.

art I can use some ext a cash, you to be interested in our new monnest. How to Earn Exem Money in 1 par Spare Time. It shows you what others have It dieses juit what others have dress, bost they got started, what this make Te be about how one men in nest I som to het profit in 8 weeks in his home shop and how you can do the Mil 426.

Illustrated Directions Show You Now to embed read howers, but leaven, but terft est seal sheliat, come, plint at in clear liquid phastic to make nomities, advertising special fless and other last selling Items. How to samuable trans lucent glass panels with em-bedments of untirual fabrics, grasses, seaweed and other in lerest me materials. How to me these panels for room diriders and servens, or fine lamps bowls and trays. Also shows a mountes that is Flouily New maintenance business. and Different.

No Equipment 1s 1 called he ther heat her presstore are needed Heat small hand or power toots process is made to order for the smaller operator with a datage or besettern shop anthe has e materials used for the haling decorative gf mass panels are nise used for repair location for example you man f hil four box opporting ty glassing beat hule, tanks, pools or develop a specialized new way of casting tiles and highly profitable todastrial

Hew To Get Started

Get all the facts before you do maythe fix the and send for How to
Earn Extra Money in Your Spare
Time It is a mighty valuable
course hook of ideas Clear cut di
rections and over the photos en
plain new inchods of using bissic
and observious you can adapt to
your own requirements. No other
book like it has ever been published before. To cover mailing
costs, send 25¢ to:

Semential Craft Division, Dept. 8-2

THE CASTOLITE COMPANY Woodstock, Illinois

SHORTHAND IN O WEEKS

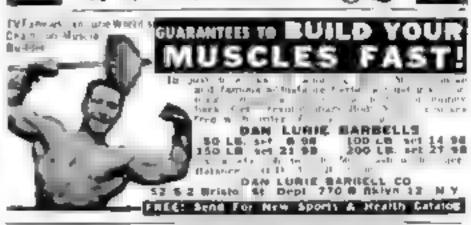
Write 120 words per minute Age no obstacle—LOWEST COST

Famous SPEEDWRITING shorthand. No symbols; no machines, uses ABC's Eastest to learn and use Fast preparation for a better position. Nationally used in lead-ing offices and Civil Service 120 words per minute 50% PASTER than Civil Service requirements Over 350 000 taught by mail or through classroom instruction. The

very low cost will surprise you. Typ-ing available, 35th Year Schools in over 400 cities in U.S. Canada READER'S OFFEET CUDE. and Hawait

Write For Free Sacklet To School of

Bopt. 2602-8, 55 W. 42 St., M.Y. 36 (A)



SCOPE SIGHTING

Ger't Parplus-Gauranteed Perfort Shell in ignit for sight nighting (Tuken S

Built in secunities # 349" long. Weight I th. @ Solld broad I dry need maker for a mility (bipertine tens in all man) and

Arbricogije mated priomatic lonoru ideal furi Princeped

Turger spotting, Bunting Surveying, Convect to oper-

JOB LOT TRADING CO. 48 Yeary St. NY 7, NY



HOLDING YOU BACK?

I have helped thousands of men and women also have not had college training in hou tish to become effective speakers, writers and conversationalists. With my new C 2 METHOD you can stop making mistakes, build up your tocabulary speed up your reading, develop writing skill, learn the "secrets" of convenution. Takes only 15 minutes a day at home. Costs little "2 page book let matter FILEE Wells TOHAY! Den Bolander, Career Institute. Dest. 1672. 23 E. Jankson, Chicago 4, 11f.

Free Book on Arthritis And Rheumatism

Y TO AVOID CRIPPLING DEFORMITIES Explains why drugt and medicine give only temporary relief and fail to remove the causes; tells all about a specialized nonsurgical non-medical treatment which has proven successful since 1919. Write for this 36 page PHEE BOOK today Dupt. 36 BALL CLINIC Excelsion Springs, Ma.

TELEPHONES

and ALL SUPPLIES

Room to room, bouse to farage private telephone service.

BANDSOT CRADUE TELE-PHONES (2) Complete outst with 1 st wire 2 dry rolls. Instructions 814 95

Workin HARVESTEE Date
Mac Magneto gathers
fish worms by electricity
Complete with instructions \$4.50

FREE literarysised booklet AA No.

TELEPHONE REPAIR & SUPPLY CO. 1700 Lunt Ave., Chicago 26, 83,



Dept. A4-203

FOR THE FIRST TIME EVER YOU TOO CAN EXTRA

METAL ZE METALS AND NON METALS

THOUSANDS

Ma sepper - allow brace + alctel chrome a pleat leather + mond planter + plantle els.

2.5 5 4 4 trate mechine puris

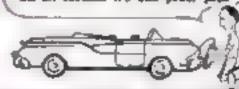
sports opide. fishing equip. game + Jewsky todio paris gelated circuits heby show flowers, sic.,

PROFESSIONAL may to plating him been Proported.
VERY Science And EASY TO USE The same day you receive pour plating outly you can have sharp FACTORY REW CHRONES IN your can have being artifled from the extension of the pour can have being artifled the recently passessions. TIS THIS ILLEGROWERING OUTSIT WILL SYN PLATE BOOMSESALS. A trease come true for data during, and de-1-yourself enthusiatio.

BEM DONABLE PLATE on your CAS CHROME the mo-ment the applicates touches your far When others are your SPARE TO REPORT THE WHAT STORE their same alsoed too. They is POUR OPPTY to make his formation make BIG PROF TS alating for others and here in the MEST REWS TET at an EXTRA BONUS con get at the meteral descript in even part one-metals. There eight you get the new with-out even cishing one power SC SEMS FOR YOUR GET stom. YOU WILL IN AMARIE.

Every left to generalized for T tall days or your manage Such Daying this T day FISE. THIS, you must be designed if most be designed. If most be dearly think on boy it could not you will need tried at all COM EXPENSE You have nothing in home Silve FOM Town of a boys fee most be commissed the in the greatest think or if need not have not you a possion.

Beat pitting at home, about garage, etc. If a many . completely porta-ble all contains life our power suck







BEFORE

P AND of space oblocks with a breakt luntre: doenb.u. protessional finish, eld evelop objects lars again before open.



principles application operation. Chromo picting telebrat. Compare stating telebrat. Compare stating telebrat. Compare stating resembles, Special metals policy, Fully likestraned instructions, 666 Bea. 600791800 \$1.50 TO BUY (Section readily problem).

M, Z. SALES CO., DEPT. L-3,

113 WEST 42nd ST., NEW YORK 36, N. Y.

We will send you the COMPLETE ELECTROPLAT BE AND MY VALUE OF CONTROL PLUS COMPLETE VALUE OF THE AND THE COLD FOR THE AND THE COLD FOR THE AND STATE OF THE POWER OF THE AND TH

Don't Let Repair Bills Drain You Dryl FIX, REPAIR, MEND Anything

Instantly With New Miracle Material i Sand You on FREE TRIALI

Stop shelling out hundreds of dollars overy year on reprire you can do yourself W th the hulp of just one With the help of just one markels material you can pocket the cash you re now spending on ear repairs, bosor patching and all the other little one that add up to big money Al, you need in this one material and I'm going to sens it to you for a ten days FREE TRIAL without your risk-lift a cent' ing a cent'

By JOHN MOSS Technical Engineer

There are Octiga abile - your home, office farm in only, on your car wash you could be yourself if you had the right

Kend of natural Mart Ban 18.400 Industrial plants and factories are now on the concernal I in talking about 11 a been process that to the last of the process of the last of the process o the STEFL So bard you can hit it with o'l scor in ght with a medge finin net. I'm le Me'a a a permanent solid metal force one of the stringest achiesters in the world. The list of things Pastle Metal can be prought to endless F's conclude.

motor black femlets lamps, bathtube, sinks spotting equipment, er sines Sticks to any surface Neter rusts. Can be unded. Hed, dribed, bured his anything that a builded chipped, dented or must ed. Repair like new pipes, builters busts, jeweley, bikes lamps. Reset in broom tales, bricks. Pinstle Metal fixes Apythana'

GET FREE-TRIAL SUPPLY AT NO HISK!

The only can way I can demonstrate that Plastic Metal can arre you bundreds of do one is to ct you put it to use at my rish! Here's the offers Man #1 95 now I it send you a full supply of Plastic Metal Use it to repair and fix anything you like. It so easy so a mple! Just apply and let dry Affec the test if not absolutely convinced P astic Metal is all I say and more, return it for full refund You risk nothing? Act now! (SAVE! Triple free relative sorty \$2.98)

SCOTT-MITCHELL HOUSE, INC.

611 Broadway

Dept. NS-144

New York 12, N. Y.



FREE

are already in time for quicker promo-et 61 years Aman-le to reach higher and mail coupon prepare Today, choose the job you want—and prepayou might otherwise waste. Or if you are work you like best start training now for tion and increased say. Buring the past can School has helped ambitious people goals. Check subject that interests you stor full information.

postpeld, Chicogo ? FREE Pelow ъ Drakel e checked please ject chec Dept. sub. Without obligat AMBRICAN SCHOOL,

Contracting
Distal Tacheldes
Douting—Machine Trees
Drafting—Machine Trees
Electrical Engineering
Electricity—Fractical
Electronics—Industries
Might SCHOOL COMESES Accounting Courses
Apprentitishly Courses
Architecture & Building
Astonicture Technicies
Butter Forematchip
Butter Forematchip
Bestween Management
Civil Engineering

Apparen. HORE OCCUPATION AND ADDRESS OF THE OCCUPATIONS OF THE OC

MAIL COUPON NOW









or Seit

Be Your Own Boss in the Profitable Excavating Business!

EARN UP TO \$1,000 AND MORE PER MONTH

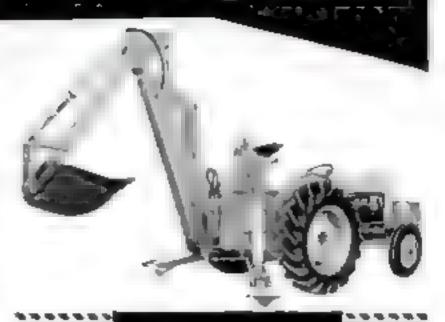
Wherever you live, you'll find plenty of profitable work the whole year 'round for this versatile outfit... not just a "trencher" but an all-purpose excavating machine! Custom operators everywhere are making big money with Sherman Power Diggers. ONE BOUGHT A FARM WITH JUST THREE YEARS' PROFITS! Work for builders, contractors, utilities, and municipalities on such jobs as septic tanks and drainfields, sewer lines, fuel tank installations, foundations and footings, gas and water lines, field tilling and many others. The Sherman Power Digger mounted on a Ford Tractor travels quickly from job to job, digs at a fraction of the cost of manual labor. It's simple to operate, easy to maintain, built to last.

Send now for information about the easy-toget jobs for your Sherman Power Digger. Let us
tell you—without obligation—how you can go
into business for yourself with an investment of
less than \$5000. Or make a small down payment

and pay the balance from earnings.

SHERMAN PRODUCTS, Inc.

Dept. 4936R Royal Oak, Michigan



Soud New for FREE LITERATURE!

Shermon Products, Inc.
Dept. 49368 — Reyal Oak, Michigan

Send me information on how I can get into the excavation business on my own.

NAME		
ADDRECE		

CITY____STATE____

Till Show You How to Have Giant Strength, Health and Success

Says: Bulladerson THE WORLD'S STROMSEST MAN

"I built myself up from skin and bones; simost died as a youth My parents' prayers and my own determination pulled me through and led me to discover my four great secrets of body building might.

"You, too, can have the body you want with full muscular development, robust health and right weight. Learn how you can transform your life with my course and a few minutes each day. Don't delay—Act NOW!"

MAIL COUPON TODAY!	11-1
Paul Anderson, Toccoa, Ga. Send me FREE your lüpstrated book giving details of "Easy Burps to Giant Strength."	felt
Name (Please print)	Best. P82
CityZoneState	_



Start TODA's to en by an exciting new hobbs. Get this big saluable or lection of garge us mult contred to angle shaped postage stamps—brought to sou to in strange and invote total lands in the wilds of Alc on enchanting humpe exotic latin America etc. All genuine additionable picturing maniesting replies soughe birds action packed sourts ancient copper ships. PLUS scarce atoms is abult as commemoratives plant and midget sized stamps. EXTRA' Bargain Calmon. Co retorn Manua in us other exerting offers for our inspection. Enclose 10c for mailing costs bupplies 1 miled. ACT NOW 1

RUSH my Pree "Treangle Collection and other offers. I enclose alle for mailing costs."

Name

Address
City 4

State



COLNTY ...



CITY

Learn "By Ear" with

STATE.

the DORMIPHONE

The Scientific Discovery That Warks for You Awake and Aslesa

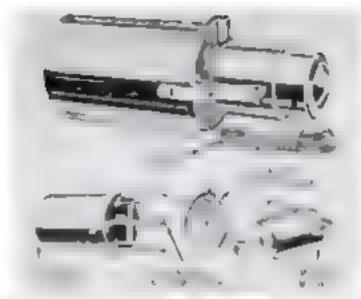
Now, at last, science gives you an easy chortcut to learning. With this amusing new tool, you "stort" to loom while continues the learning process for you while you go off to sleep.

Do you went to learn a tanguage—memorize a speech or an array of important facts, figures, formulas—Correct your speech—Break bad habits? The Dormiphone SAVES YOU TIME—EFFORT So almole to use children benefit—so helpful and practical it is used by educators, psychologists, people of sit ages, occupations all over the world.

Break Down Barriers to Learning

Find out HOW the Dormsphone works FOR YOU-how it can he'p you learn anything in less time, without intensive soif-application. Write for PREE Book. A New Dimension in Learning or call for FREE DEMONSTRATION—Get the Scientific Evidence Teday.

MODERNOPHONE, INC. 262-028 Radio City New York 20, N Y Gentlement Please and my your FRFF, Booklet. I am interested in learning more about he isohimitrione and what it can do for my No obliga on the specimen will call. [] If under 16, thech here for Special Booklet 4.			
ADDRESS			
Wy main interest in the Dormsphone to for: Learning a Language Speech Improvement Sirep Inducement School or i of ege Work			



AUTOMATIC ICE CREAM MAKER

paddle made ice cream sherbets fruit ices frosted mik paddle made ice cream sheroets trust ices fronted in it shakes... up to 1/2 gallon at a time. In the patented compact electric machine ..., fits into freezing compartment of refrigerator or home freezer. Automatic, thermo cut-off switch stops motor when freezer whipping is completed Bright chrome finish. Removable 110 V AC motor 9 ft cord (refrigerator door closes over cord—won't harm it), Leakproof cover Removable nylon scraper-paddles Home Economist and U.L. approved. 5 g 121/2 in. Recips and instruction booklet U.L. approved. 5 g 121/2 in. Recipe and instruction booklet included. SATISFACTION GUARANTEED OR MONEY BACK

Postage Prepaid \$34.85 KNIBB INDUSTRIES. INC.

300 M. MICHIGAN AVE.

CHICAGO 1, ILL.



Sentu variable den eradet it sa est again to a winder planter plates, NO 1M 90588 ONS we do thour read toward me and We goe vint men only paret. We reache the new control of the CLARANTEL TO SATISFY YOU OR HIST NO YOUR VONEY

SEND NO MONEY - Send at your name today and well RUSH COMPLETE DETAILS. Hegin to enjoy life eight how, Che this

CHICARD BENTAL PLATE LANGEARDER & DUPLEMEN 38 M. Beerhorn St. . Sulta 714 . Chicago 2, IR.

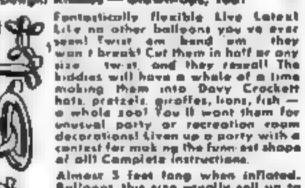
FABULOUS, NEW

GRAFFES-DACHSHUNDS - Fets of All Kinds

Mode of Live Latex

Add 25c | Fostage. ond **Hondling**

Dolight Kiddies — Grewn-Ups, Tool



Almost 3 feet long when infloted. Bulloons this size waspily sail up to 25c each?

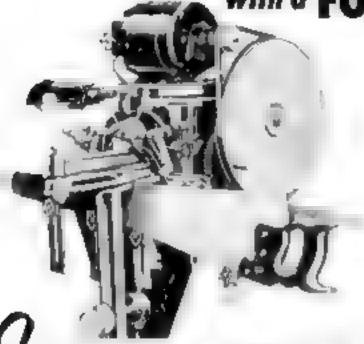
Sand only \$1 new. Flus 23c postage and handling for 200 in a variety of pay cotors! Supply limited at this low price, so order several sets HOW for GUARANTEED PROMPS DELIVERT MONET BACK GUARANTEE.

MURRAY HILL HOUSE

P. O. Box 251, Bethpage, L.I. N.Y.

Last year's profit \$ 📑

with a FOLEY AUTOMATIC SAW FI



"Last year's profit amounted to \$3,000. Not so bad for a one-man outfit"-from Chas. C. Hough, James B. Williams wrote us-"I made \$765 last year filing saws, and it sure comes in handy. I do this work in my spare time," Men in communities of all sizes make up to \$3 or \$5 an hour with the Foley Saw Filer working full time or part time.

It's no trick to take care of the saw filing for your neighborhood hardware or lumber dealer - plus looking after the saws for farmers, townspeople,

manual training departments and factories. The Foley files all hand saws, also band and cross-cut circular saws. It's a repeat cash business, no canvassing, no eyestrain and no experience needed.

end Coupon for FREE BOOK

SHOWS HOW TO START

"MONEY MAKING FACTS ' shows just how you can start at home in your spare time working in your basement or garage It's an immediate cash business that can develop into a full-time repair shop, Send coupon today-no salesman will call

FOLEY MIG. COMPANY

219-8 Foley Muliding, Minnespolis ell, Minnespta Send me free book "MODREY MAKING FACTS"

Name

Address



If show you a timple cosy way to make dizzeny af Made to Order cases for musicians selesmen hymners, manufacturars, fishermen gur correctors. phonographs and OOs after portables I'll separa matructions loors, materials - energining pas need by plan is absolutely safe! You not belling! here your present job and work sparetime until you decide to devote full time to this big day work that is no ligh up your shap wherever you have

MY NATIONWIDE SALES ORGANIZATION WANTS WORK FOR YOU!

e few spars from With my plan aboute can have his own business willout a by mustwent are althout previous experience, and four-order you distill have to every about sales because my Rational Sales, Staff softs for you

I all very safetives to make a small profes bucause I can count on by volume on the outsides it sell to Constructors, pel flores morkers make at the grafit because the for-shed cases self for up to see hines the Write for full (REL details foday) cost of materials.

ABARSI CASECRAFT WIT EMPERT DOGLEDAN



Make \$20 to \$30 a Day by ...
MAGIC MAIL PLAN!



the machine a Plastic Scaling a Job - ordered by mail only lie to material cost brings in taking out of back \$2.68 in cash by ma Capacity of machine. \$25.00

profit per hour of equation,

- the name in SPARE TIME at home - or expand into FULL TIME business. Bend coupon for Free facts about the newest and most fascinating of all home operated busin sees. For the first time a simplified man the brings the fuhu not profits of Plantic Senting and Plantic Lamination within the reach of the sens' operator. Anyone can learn to operate the machine with

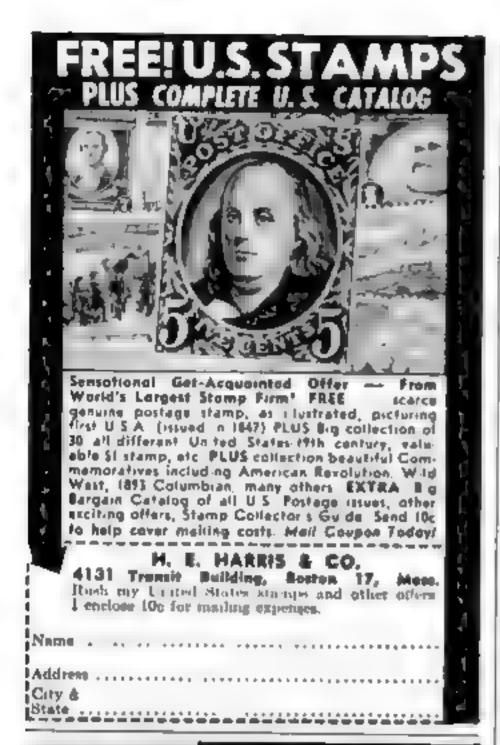
supply the circulars you mail to bring back cash and orders. Don't waste a m nute Rush your name We'l send you FREE and postpaid, pictures, prices, details, and all the facts you need to start. Mail coupon or cool name on postcard. No charge. Warmer Electric Co., 1612 Jarvin Av., Dopt. L-3-B, Chicago 28, III.

Make Thousands of Beautiful Art Creations COSTUME JEWELRY . CIGARETTE BOXES

TRAYS . CANDLESTICKS . COASTERS LAMP BASES + BOOK E SPARKLING COLORI

MD	\$ ALL IN /	i
ED	PLASTIC/	ı
18	TEST /	
77		ì
	1 2 20	k
7	1000	ı
_		1

	TRIC CO., 1512 Jarvis Av. Chicago 26, III.
At no cost to r	ne piesse roch complete detalls d. I am under na obbystica.
32	
1	
Address	
City	SonsState







far fådbildean

CLOGGED SEWER5? 医尼州尼州亚尼宁 了什么 COSTLY PLUMBING BILL-

Chicago bob let had investigated is a Pres Blooklet on much rea worth enable the Home Owner Junitor or Factory Maintenance Man to Ited at homself

Tel day the can operate this new Rod-ding Tool which is whirly down the drain this few seconds, 6. NAS LATHTI HS. THEFTS, CRINALS, FLOWIE DICALNS (100 St. Te) NTREAT NEW HS can be cleared of Plans Armed Park March cleared of Hass tyrense Paper Sand whole there tender can be added for re-the take roots A new theorety in Swedich Music Wire gives the red 100% more

Another new unit is the Miller Electric Another new unit is the Miller Ricettle It alder which has patented cuttings that expects and unit rully to the size of the pipe It will clean out bears observations in tipe than elect 3" to 12" Boat or Size is that the Hambert 3" to 12" Boat or Size is that the Hambert 3" to 12" Boat or Size is that the Hambert 10" Boat or Size Transmorth in COSTLY FLUMBING BILLS SAVED Tear that A low and write and address the clean of the FREE BOOKLET on Hand and Fluctual 1 of a BOOKCET on Hand and Floring In the Obey that urge No Agent with a L. A post card at 12de 1 house (Phope Kaldare \$ 1702)

MILLER SEWER ROO, Dept FEB. CHICAGO 30. ILLINOIS



ANOTHER OF INDUSTRY'S

MOST-WANTED MEN

Aero-Engineering Technician

-to work with top engineers and scientists on jet and rocket design. f.C.S. can help you qualify for starting position.

SEE SPECIAL OPPORTUNITY CHECK-LIST - PAGE ST

66 POPULAR SCIENCE

your F.C.C. LICENSE First Class Commercial

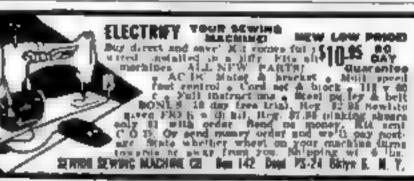
The key to better jobs and higher pay in elec-tronics is a 1st class commercial (not amateur) FC.C. license Federal Gov't evidence of your qualifications as an operator-technician. We frain you quickly—by mail or in resident classes. Get your lat class F C.C. license in 12 weeks—NO previous training necessary. Our schools are located in Hollywood and Washington Write to the school nearest you for our FREE booklet of details.

GRANTHAM SCHOOL OF ELECTRONICS, Desk 85-8 1505 M. Western Ave. OR 821—19th Street, N.W. Hellywood 27, Calif. OR Washington 6, D.C.

TEST YOUR OWN now! DIO TUBES

for Managet brooks

all of them—even picture tube hearly half of TV across cales are due in defective distribute. Texter shows if fl amount are good, Insert once a tester light shows if latte is burned out Fary note the array of call ouved imparts to the call caps AC or DC Checks flatte, appliances at Only 3.74 ppd or C D D plus charges. Delays the tipe of the call of the c



GOVERNMENT 40 ACRE

Act of Congress gives citizens equal rights with Oil Co's, to obtain Govt. leases. You do no drilling, yet may share in fortunes made from oil on public lands. (Payments if desired) Licensed & Bonded Oil Brokers. Free Information & Maps of booming areas, Write:

> NORTH AMERICAN OIL SURVEYS 8272-AM Sunnet Mivd., Los Angeles 48, Calif.



BRINKMAN MANUFACTURING CO. 540: W. 21st Dapt, 828 Topoku, Kans.

AND TOUGH TEXTILES LIKE A MACHINE

AND TOUGH TEXTILES LIKE A MACHINE
With APERIT STITUTELL Automatic Sawing Awi
adaptor can quarkly and ski four saw or repair any
thing chaine of LTATPITE I ANNAR, NYLON PLAN
The of other heavy materials Sews from even took
stacines like a machine wete into hard-to reach
place operately made for heavy data sewing on
Lt. 4, 44, E. FOOTWEAR RLOS AWNING, SAILS
SAIDTERY CARRY CARRY OF HALLS IT TO TOOK
SHORES I EAR and other lough sewing tobe liene of
the land-test hool your il ever own Wild save you
many times to small out. These rends for instant
use roin, we with loobing of wasped
thread and it destroit tropes of dramingly
pooned needles. Ear to be own direct one
with make you she enced in manufes. Excenprecise and wasped thread aways avail
able. Save money sent #1 28 for post
pack do livery If 10, 2 \$1.98 Jun
postage MONEY BACK GUARANTEE

SPORTSMAN'S POST 366 Madison Ave., Dept. A-52, New York 17





Rush a posteard today for my powerful FREE Shoe Selling Outfit. It contains everything you need to start a steady profit, repeat-order shor business! Just 2 sales a day earns you up to \$217 a month EXTRA! It's smazingly easy! Just show friends, relatives Mason's famous shoes with comfortable Air-Cushion innersoles. People like buy ing the Mason way because they choose from over 160 dress, sport, work styles for men and women—including Nylon mesh, Cush N-Crepe and Safety Toe work shoe styles licenuse you draw from stock of 200,000 pairs. in an amexing range of sizes and widths, customers get the exact size, width and style they order!

Our shoes are not sold in stores
... people must buy from YOU?
Start making BIG MONEY now
... send for your FREE Special
Outst TODAY!

MASON SHOE MFG. CO. DEPT. A 149 CHIPPEWA FALLS. WIE.





PROTECT YOUR

and Increase Your Comfort

Send at once for FREE labler Learn how proper handely being you go a cody for piratory disease, bote to be more enotogiable on hem fuel. Write Dept. 198-2.

> THE HUMIDIFIER ASSOCIATION 20211 Harvard Avenue Cleveland 22 Ohio

SAVE '10.00 NORELCO "Speedshover" Mens Electric Shaves. Latest model brand new and fully guaranteed. Complete with case cord and cleaning brush Regularly retails at \$24.95 Our price \$14.95 postage of. All orders billed within 24 hours. Your money back if you are not by y satisfied. Send check or money order to JOHN BROOKS. Dept \$13. Box 252 St. Louis J. Mo.



ANYONE WHO UNDERSTANDS SIMPLE 7TH GRADE ARITHMETIC CAN USE THIS STANDARD SLIGE RULE!

He modern-use this quick easy way of figuring. For business men students carpeniers machinate salesmen problem and emreavers office workers farmers, merchapts time accepes plumbers electrievans-everyone Who does figuring can have time and labor with thin a do rule.

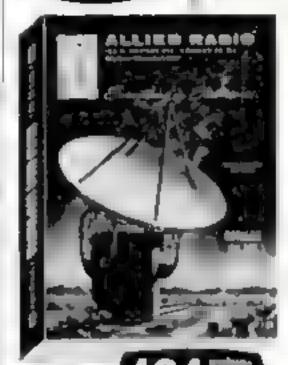
Districted Instruction book shows you how to get cut perf manders instantly without peach and paper (That get MITH alide rate and instruction book for only the partpool Satisfaction guaranteed or refund)

Nelson-Half Co., 210 S. Clieton, Dept. 85-1, Chicago S

see the amazing new EASY-TO-BUILD ELECTRONIC IED knight-kits

in ALLIED'S 1958 ELECTRONIC SUPPLY CATALOG

BUILD YOUR OWN! SAVE MONEY-HAVE FUN







HOBBY KITS



INSTRUMENT KITS



HAM KITS

on Everything in Electronics **WORLD'S LARGEST STOCKS**



Everything for Experimenters, Builders, Amateurs, Servicemen, Engineers and Hi-Fi Hobbyists. Get more for your money in Hi-Fi systems and components; build-yourown KNIGHT-KITS, recorders and phone equipment; TV tubes, antennas, accessories, Amateur station equipment; test instruments; industrial electronic equipment plus the world's largest stocks of parts, tubes, transistors, tools and books. Send today for your FREE



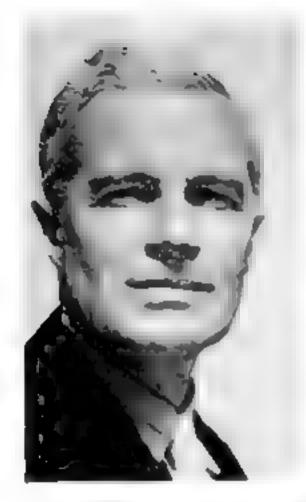
1958 ALLIED Catalog! Everything in Electronics From One Reliable Source

	OW STILL YOUR BASY TER	MS AVAILABL
		send for
		Cutalog
ì	ALLIED RADIO CORP., Dept. 111-88 100 N. Weslern Ave., Chicago 80, III.	
ř	Rush PREE 1958 ALLIED 404-Page	Catalog

O	Rush	PREE	1958	VITTED	404-Page	Catalog
N	2 <i>me</i>				_	

Address	

City	Zone	Conta
Lary	Lone	



I'd like to give this to my fellow men...

while I am still able to help!

I was young once, as you muy be-today I am older, Not too old to enjoy the fruits of my work, but older in the sense of being waser. And once I was your, desperately noor. Today almost any man can stretch his income to make ends meet. Today, there are few who hunger for bread and shelter. But in my youth I knew the pinch of poverty: the emptiness of hunger: the cold stare of the creditor who would not take excuses for money. Today, all that is past, And behind my city house, my

summer home, my Cadillacs, my Winterlong vacutions and my sense of independepce-behind all the wealth of cash and deep lanet satisfaction that I enjoy-there is one simple secret. It is this secret that I would like to impart to you. If you are satisfied with a humdrum life of service to another master, turn this page nowread no more. If you are interested in a fuller life, free from bosses, free from worries, free from fears, read further. This message may be meant for you,

By Victor B. Mason

I am printing my message in a magazine. It may come to the attention of thousands of eyes. But of all those thousands, only a few will have the vision to understand. Many may read, but of a thousand only you may have the intuition, the sensitivity, to understand that what I am writing may be intended for you -mny be the tide that shapes your destiny, which, taken at the crest, carries you to levels of independence beyond the dreams of avarice.

Don't misunderstand me. There is no mysticism in this. I am not speaking of occult things; of innumerable laws of nature that will sweep you to success without effort on your part. That sort of talk is rubbish! And anyone who tries to tell you that you can think your way to riches without effort to a false friend, I am too much of a realist for that. And I hope you are,

I hope you are the kind of man-if you have read this far-who knows that anything worthwhile has to be earned! I hope you have learned that there is no reward without effort. If you have learned this, then you may be ready to take the next step in the development of your karms—you may be ready to learn and use the secret [have to impart.

I Have All The Money I Need

In my own life I have gone beyond the need of money. I have it. I have gone beyond the need of gain. I have two husinesses that pay me an income well above any amount I have need for. And, in addition, I have the antialection—the deep saturaction—of knowing that I have put more than three hundred other men in businesses of their own. Since I have no need for money, the greatest saturfaction I get from life, in sharing my secret of personal independence with others seeing them achieve the same heights of happiness that have come into my own life.

Please don't misunderstand thus statement, I am not a philanthropist. I believe that charity is something that no proud man will accept. I have never seen a man who was worth his salt who would accept. esmething for nothing. I have nover met a highly encountal man whom the world respected who did not eacrifice comething to gain his position. And, unless you are willing to make at least half the effort, I'm not interested in giving you a "leg up" to the achievement of your goal. Frankly, I'm going to charge you something for the secret I give you. Not a lot-but enough to make me believe that you are a little above the fellows who merely "wish" for success and are not willing to mariflet something

A Fascinating and Paculiar Business

I have a business that is peculiar one of my husinesses. The unusual thing about it is that it is needed in every little community throughout this country. But it is a business that will never be inveded by the "big fellows". It has to be handled on a local basis. No gant octopus can ever gobble up the whole thing. No big combine is ever going to destroy it. It is essentially a "one man" business that can be operated without outside help. It is a business that is good summer and winter. It is a business that is growing each year. And, it is a busipeas that can be started on an investment so small that it is within the reach of anyone who has a television set. But it has nothing to do with television.

This business has another peculiarity. It can be started at home in spere time. No risk to present job. No risk to present income. And no need to let anyone else know you are "on your ewn". It can be run as a spare time business for extra money. Or, an it grows to the point where it is paying more than your present salary, it can be expanded into a full time business overnight. It can give you a sense of personal independence that will free you forever from the fear of lay-off, loss of job, depressipps, or economic reverses.

Are You Mechanically Inclined?

While the operation of this business is partly automatic, it won't can itself. If you are to use it as a stopping stone to independence, you must be able to work with your hands, use such tools as hammer and screw driver, and enjoy getting into a pair of blue jeans and rolling up your sierves. But two hours a day of margial work will keep your "factory" running 24 hours turn-

ing out a product that has a stoady and ready cale in every community. A half dollar spent for raw resterisis can bring you six dollars in each—six times a day.

In this moseage I m not going to try to tell you the entire story. There is not enough space on this page. And, I am not going to ask you to spend a penny now to earn the secret. I'll send you all the information, free, If you are interested in becoming independent, in becoming your own boos, in knowing the sweet fruits of success as I know them, end me your name. That's all, Just your name. I won't ask you for a penny I'll send you all the information about one of the most fascinating businesses you can imagine. With these facts, you will make your own investigation. You will check up on conditions in your neighborhood. You will weigh and enalyse the whole proposition. Then, and then unly, if you decide to take the next step. I'll allow you to invest \$15.00, And even then, if you decide that your fifteen dollars has been badly invested I'll return it to you. Don't heatate to send your name. I have no salesmen. I will merely write you a long lotter and send you complete facts about the business I have found to be so successful, After that, you make the decisions,

Does Happiness Hang on Your

Don't put this off, It may be a coincidence that you are reading these words right now. Or, it may be a matter that is more deeply connected with your destiny than either of us our say. There is only one thing certain: If you have read this far you are interested in the kind of independence I enjoy And if that is true, then you must take the next slam. No coupon on this advertisement, If you don't think enough of your future happureas and prosperity to write your name on a postcard and mail it to me, forget the whole thene. But if you think there is a destiny that ahapes men's lives, send your name now, What I send you may convince you of the truth of this proverb, And what I send you will not cost a penny, now or at any other time.

VICTOR B. MASON 1512 Jervis Ave., Suite M38 CHICAGO 26, ILLINOIS



OPPORTUNITIES

Here are hundreds of appartunities affered especially to the readers of Papular Science Monthly.

Read them, Answer them! You can make and save money.



POPULAR SCIENCE MONTHLY - 353 FOURTH AVE. - NEW YORK CITY 10

Classified Ads only \$1.10 per word insertion, payable in advance. Minimum ad 10 words. To be included in April Issue, copy should be in our office by February 21. No concellations accepted after February 15. Address orders to O. K. Kelly, Classified Adv., Mgr.

AUTOMORILES & MIDGET CARS

OLD copies of Popular Science wanted any issue from period ,800 to .U.5 Condition not loo important provided books are complete in the outpages removed. Write to Bex No. 308. Tuckshop New York

BOYS Power driven auto Build your own Plans 15 cents Sypher Co Sta F. Toledo, Ohio

NEW Catalog on Power Cams and Flywheels 35c Weber Cams, Box 33175, Los Arge es 33 Calif

CROSLEY And Poreign Car Owners Cat alogues Available Parts Discount Box 7, Emont New York

NoNDREDS of naturable catalogs old new and foreign dealer books glass photographs, shop manuals free moses stage thes inted by non-profit club, Write to get on free mailing list. Auto Manues, Inc. Stockbridge, Mich gan

AUTO SUPPLIES A EQUIPMENT

SAVE money on Jeep and army truck parts Large inventory Ca slogs for Jeep and G M C owners American Auto Parts Co 1830-PE Locust Kamas City Massourt

AtTO Accessory and Parts Catalog 1858 ed ton all new' 229 pages Save up to 50 75 000 teme including Hollywood accessories his speed equipment for all rare and trucks Hard to set parts Send 35c (refut dable) J C Whitney 1819 PS-3 Archer Chicago 16 Limots

PREE Cant 1956 Parts Cataing Thousands Scarce A resource Stores Don't Have Caderts Custom Equipment Send 25c Postage (Refundable Newhouse Automotive ladustries 5805 PS-1 Beverly Los Angeles 27 Unit

FORD A and T parts? Try best source old model parts at makes Wassiewski. Milwauker ? Wisconsin

COMPLETE overhaul \$3.95° 10.000 mile distantee! Effess. 2017-5 Muffat, Toledo 6. Ohio.

PUT Leap in Your Jeep Henry-J, or Master V & Power See Jeep Owners Ad. Page 64

HEND Only One Dollar for Life Memberally Registration Receive With Your Membership Card Your Free Three Dollar Automative Oft Now Being Sent to Present Members Clane Economy Club, San Cabriel California

RECHROMINO Kit for Automobiles \$2.60. Details. Pairmont Chemical, East Syracuse, New York.

PORD "T" Parts Headquarters Free Catalog Ernie Hemmines Quincy Illinois

BTOP Transmission Lubricant Leas With Easy To Instal, Davis Bal, Boot Protects Bal Housing and Drive Shaft Coupling Prevents Wear on Metal Paris Saves Expensive Repairs For Cherrosets .94) Through 1854, A.) Models Ad Transmissions, Write for Free Literature Davis Bal, Boot Company Inc., 2305 Tale Street, Houston, Texas.

RING-Valve Job while driving \$6.00 Literature, Motaloy, Grantham 27 Fa

RE-New Your Motor Quickly Save Expensive Motor Overhaul Gustanteed Motomagik, 21330 Type Street, Hayward,

TO FIND WHAT YOU WANT

Advertising Alfunctus for Advertisers to tool to the 6 Indian torners Personal design Astronau a Auto Trat win kat to les & Midgel (are Batteries Generators Ric. Po at Hopky we be the files. Ele a the passes of . SPA Tory It Whote-sale amorea Photo buppose at my kep does a Tenta at a by her Paretta the h Talka hernetts a Phasica . 54 or Photo Fin shing 29 411 47 Is y until 伤吓 (Part) I Prior to shat A to root of French Spanners Panishes & French Spanners 43 ting see Meters the 30 In the Other Real betate for d. 1.5 in Telescopes in the Mar Mare Interior For the Norw 14 - 191 . 86 Formulae, Plane the 20 Catties & En estatement Gelder Coun pra Broavage Finders 244 Help Waghed 43 H higheste nabermen it high filler coppe Hime trafferman 31 Marpinot semi 2.6 Inventions Wasted 91 Language Outlite 3 H Mark his 5. That happeles I have a first the Photon of the State of Mark and A People on Suppose Mark at the Mark at the State of the S M. e. and the Managelier
M. restricts of Opinion of their 46.4 Motoregrand, Biegralds & Bupplies Music Sour Writers & Reputtes 33 Of Interest To Women. Not and draw t Welches. Nd Scamps Wanted Patent Attorneys For Sale Presentation. tin shing Photocopies Ele Pinstles. nine es l'in-Pour ry & Supp. ex. Print ng. Ma. Leagh in: Etc. Print ng. Outsité Supplies Penticable throughtimes Radio TV Supplies & Dyslamont Ras y Brades Shavers Subtree Statege & Office Supplies 54 Sport of Services Sport of Services Sport of Levels Game Picking Tacking BH Stamp following Tattoring Supplies
Tobeccu & Pipes
Trees, Shrubs Roots & Merbs
Tree mometers
Transcribers & Office Machines 20 Wanted to Bur Watch Repairing

Westing Apparel ... Welding, Soldering Western Merchandles Shertmeta, Mou ding 60, off List Pormer Dodge Pymouth Dealer Write of Phone Dariel Motors, Inc. 261 Wanaque Ave. Pompton Life N. J. Terhune 5, 2800

WONDERPUL New Paint Spray, Do It Yoursell Kit Hot Hods Repair Customize Your Car for Dimes Sprays Anything Lasts Lifetime Gustanteed Pull Kit 53 93 Postpaid Kits. 1947 Belvedere, North Vancouver, Canada

AUTOMOTIVE Safety Equipment. Aim Company 143 Verona Avenue Newark 4. New Jersey

GEN -Exc. Generator Exciter Keeps Generator Working Full Time. Rismir ate Regulator And Fattery Trouble Write Scientific Electric Co., Box 12 Wickliffe. Obio.

IF you have a product or service that can be operated up a mail order basis write me loday I wil send you a Free Kit on How To Make Money Out Of Classi ned Advertising Next issue wil be April Coang date February 21 Hurry Du it Tiday O K Ke is Classified Adv Mgr Dept 28 153 Fourth Avenue. New York 10. N Y

ACTO TRAILERS

BUILD Expanding such loot trailer Accommodates five Literature for Pramat Company. Wilm. of a Massa Lucette.

MOTORCYCLES BICYCLES AND SUPPLIES

RECOMPTIONED Motorrycles and mutors Christiam accessories, Complete stock ind an parts Expert rebuilding Fast service Indian Motorrycle Sales. Kansas C to 27 Missouri

MIDNETT car \$10.00 Quarter midget \$35.00 Boodlebug muluracotter \$20.00 leas tragines Engines \$2.50 up Witters \$18.00 Servicede \$35.00 Ma jorder only Send 25c (35e for Drat class mailing) for new Directors Catalogue Number \$1 deting these and hundreds of other bargains in new and used motorscoolers, midget care himsels iders parts page etc Midget Midget Directory Athens Obto

NSU scoolers and motorcycles BMW motorcycles 2 to 15 HP analtdrive and chaindrive Butier & Smith POB. 45 New York N

Affect of the property of the area of the

AVIATION

AVIATION Surplus Bargain Catalog One Dime. Son 27831. Thomasville, Penn.

ANTI Gravity Research Latest Notes \$1.00 Also included Certrifugas and Cyclic Propulsion Data He loupter Rams and Phile Jet Engine Plans \$1.00 Each Decker Engine Works Plantered, Virginia

COVERNMENT Surplus Aircraft and All Misc Items List and Procedures \$1.00 Aristica P.O. Box 250. Ar ade Sta., Nashville Tempesace

GOVERNMENT Sells Surplus Aircrafts Fusciages Assemblies Accessories. Engines lestraments Electronics Mac Bur Direct New From U.S. Government Depot List & Procedure 51 00. Brody, Box 1-PSA. Sunnyside 4, New York.

Ta

HOMEBUILT Helicopter Handbook, Ban Diego 4, California

HOMEB. II T Helicopler Rolors Picture Speca Prices boc Adams, But 8042-C Lakewood, Ca f

PHOPPLIKES plans supplies for air-boats and stomple of Labor designs prompt dedwery Catalog 25c Barks Maxwel Box 1801G. Ft Worth E. Texas

LEARN To Ply in a Plying Chib. Plying Chib Handbook—\$1 00. National Pluing Caib, Box 34P West Point, N. Y

awai.L He loopters Theory and Guid-la us. D awings. Construction Data 12 (0) Sandh I Aiferaft Box 436 Aikin-Not bell in

ELECTRICAL SUPPLIES A EQUIPMENT

ELECTRIC Pencil Engraves all Metals. \$7 00. Beyor Mig., 18511-C Springfield, Chicago 43

LAMP parts Wholesale. Thousands of Stems for repairing converting Culana 25c Brown Lamp Box 30-D. Clayton 5.

MAGNETT/TR-Magnetizen Sependers ets et Os y 2) 00 Postpaid. Eublak. Hubbs gemi ha ie; Prond

WELDING BOLDERING

BUILD-Your Cien welder or weider and power combination Law east unit carnected to used excise icts you well ally-where Free book et tous bow Get into ac Stable we'd ag bistoms. Write Hobart-weld live P 283. Toy Oblo

WELD solder, rut brase 's' welder rompiese \$7 95 Plane to: 21 \$3 85 Planes 50: 21 \$3 8

ACKTYLENK Weding Outfits new \$54.50 A the ders \$50.50 Easte Weidtig Dept 42.5065 It sedwar Chicago 60 Li

WELDERO 110 220 Weids 1," 810 to Morris 1070 Inner Drive, Schemettady New York

WELDERS Make Pire Past Selling Return Complete Plans \$1.00 Kella, \$17 W Mr And was Medical, Oregon

MACHINERY, TOOL SUPPLIES, ETC.

LIGHTWEIGHT, inexpensive, portable suncrete mixer Just patented. Pres literature. Beren Manufacturing Company 906 Duling San Antonio 10. Texas

PIPE Jaws for Your Machine Vice \$1.78 to 2 H A. Jonnson 1921-A La Cresta Ave., Oakland, Cal.

NEW Burplan-R S. Mining Cutters, Drills, Save to 80% Sample Cutter \$1 00. Dozen \$6 60. Free Last Salme Enterprises. 60 Greendale Avenue, Worcester 6, Mass

POWER Page, not take Dre with Factory catalogs World Tool Supply. Bot 4404, Joyneid Station, Detroit 28, Mich. Box M Sala

Oil Drum Cement Mixer Assembly E t Cir a ar Nu-Way-Do Co., Newaygo.

ALUMI-Steel Craft Tools \$1.00. Ma-chinist gages Campbell Tools, 1424 Bartiny, Springfield, Ohio.

PREE Power Tool Bargain List Lair-craft, Box 8-5000, Detroit 35, Michigan.

THIGONOMETERS

ENGINEERS. Denftamen. Studenta ! Triangulator Makes Trigorometry Tary 1) 00 No COD Trical, Box 01 Buffalo 15, New York

ID FUGINES, MOTORS, ETC.

Diking Injector Parts Wanted GM51 71-110 Series. Mayer, 7120 Curnegle, Clevalend 3. Ohio.

PACTA engineering data, miniature the lar and diesel engines. European. In caree I us rated bucket on But 116, Cincinnuti 42 Ohio

REWIND Motors yourself Complete inatructions \$1 00. Lowis Mig., Howell 11, , Mary Education

FREE Catalog Civiches Eugenes Mo-forbeites, Mowers Eris, Loren Products, Dans pr. I., with

11 BOATS, OUTBOARD MOTORS

NEW used, rebuilt marine motors. Ma-Pine convert one A fings Pice Cutes & States Marine Supply Dept 23, Co.4water Mich

FIRRGLASS your boat! Wholesale prices Send for information, sample. Aqua Glas, Nor 642, Attadens, Calif.

FREE big catalog Bont Kits save to to \$1.00. Homebullt Helicopter Directory 2.3 factors but a prices a through 3.00 Urahan Box 4312, N P Station pubboards designed for amateur attemb. Trailers Pibergian, Hardware A crase thes Luger Dept E 2, 9300 Accum Rd. M rarepolis 25 Miniscota

> NAVE Money Now, used outboard motor parts Send wants Stamp appreciated. Outboard Motor Mart 2,5-5 State. Boston 9 Massachusetts

MARINE conversions Ford Chevralet | V8, Jeep engines, Catalog 25c Lehman | Manufacturing Co 9124 Broad St New-47 E 2 N J

PULL size cut to shape boat patterns, bineprints 7, 10 feet. Big new 88 ng illustrated Ruld a Boat Catagor of Vava as rest designed Cruisers. Rurabox is 8k 75. Outboard Breats Sailing Res of H. seboats for H w to Board a H of Boats of 12 to Cieves and Boat H e raig Catagor of 12 to Cieves and Boat H e raig Co. Limit A 71 Box 1651 Cours and Only

BUILD monthrow ski boat Complete plane \$2.00 1534 N W, 12nd. Obshlosta

BOAT Plans Full Size Patterns Frame Kits, Modern Inboards and Outboards for amateur builders. Complete New Catalog 500 or specify requirements Glan Marine 2152 Romecrans Beliffower, Calif

BOAT Moder Combinations Plan and 8 25 00 Moderd Lagarrake \$205 no 260 Powerboat Plans Catalog Mr. Marine-fort Bux 18, P. Binghie, Mass

II BODY BEILDING LOURSES, JIL JUNE & ATHLETIC EQUIPMENT

BUILD powerful arms theat shoulders 32 exercises 51 Formed Box 601 (5:00 Market Wilnington 60 December

OUTSTANDING Physical Development Any age New touglar teed This overy sea. Ut ly A Rope! Bt eng is Hearth Manney from Deta a Ropers ton 4014 B Art San Diego 15 Cantorilla

HOW to Build Mights Muscles for All the Beds Pully Lituatrated Course Me Juffrmen, P.O. But 1640 M. L. Beattie J. Rach

KARATY Deadly Oriental Defense En arred Rd tion Rell Taught in Pictures S. M. Jim Lee P. O. Bus 248. Oakland &

BE Taker Coach a Inch At A Time" System 4: 00 Core sete Natisfact antonar accord Marts Snyder Bus : 30 HH, Union City How Jersey

PUNKED mound? Due t take numerose from the on the three the shock of the rever had morn you had Pare to 3 six C missele fully some rated course in one volume as to get a due and at red forces held \$1 now Money back guaran-Bette Publishing Co. Amstrelle 10,

BARBELLS Body Building equipment Contract 2 or Cate of Structure Barbels.

BARBILLS Dumbbe is Exercise expupby I C) Surpado Mar late Ark

Home com Schools C to Rt 12" a 16" to ca Calivas Una affed Comparts W h to P.P. No. C.O.D. Hell Co. P. O. Bux

FIFTD OF SSES, TELESCOPES

MICHOSCOPE Caraing Free Research Camping handbook Morson 10-150 to Avenue, Long Island City 1, New York.

New York 1 N Y

DYNARCOPE Sensations, New Reflecfor Iries ope Send for details Criterian Company Dept Du-66, Hartford, Com-DOMESTIC AND LAND

FREE Cala orue: Thousands war +urpass contices bargains Leaves, Priama Televisies Birton and etc. Set d \$1 m for 10 Lean Hobby at bet and Propert book of G Jacques 601 West Merrick Road, Lym-brook New York

REFIECTOR Telescope Kith 67 23 (3") to 11 5 30 (.P) Marte v Ce is, Pocusing Me : 16 Tripode E e Systems Anything eve) I he in telescopes Pres Catalog Asso Reads to use telescopes from \$23.00 Esco Products Onkridge, New Jersey

MIDWINTER sale excritice prices precision benoru ara Frider, Pirocular Select-Mercury Bidg, West Los Angeles 15. Chill

BINOCULARS, telescopes, murphropes Terrific railes D H up Request free morey saying cataing Criterian, Dupt 5-63. Martford, Connecticut.

WAR Surplus bargains! Millions of lenses leatraments to escapas, binoculars, com someta and complete line of extranot as telescope Heins World's greatest solass market place Bend only \$1.00 for heat ner's 10 era kit and big instruction backet Stock 2 CN. Write for rataing CN Pree Edini New Jetory Educated Scientific Co. Barrington,

MAKE 4" Telescope reflector, Glass, abrasives instructions—\$12.00. P Camerser Box 65. Inwood 66. New York

ASTRONOMICAL BOOKS AS AS ASSAULT free lat Berbert Luft 60-11 239th Street, Ba s de 44 New York

R 2D year on a Reflector Telescope. Comp ete & t. Mirror 5 el seces. Tripod, all other accessories Request free I ontrated aterature Criterion Manufactur-

5 FFLECTING Telescope completely as sembled five \$20.75 trustmilled Ob-servatory dearness Free information by acres \$75 Firth Avenue New York \$7

REFLACTOR and reflector telescopes A so mertira series in pude etc. fr mak-ing that out to escouse her i untraced money Suffack Bate see Mail tuck N. Y.

SPORTING GOODS, GUNS, PISHING TACKLE, ARCHERY, THAPPING

PRFE Giant 1927 Wholesale Sporting Greek Cate of Lourst wholesale prices Complete the of cameras above is goods, an interest outdoor stems. Write lodgy as is by Distributing Co. 112. Main 81. Det 1 PS &a eas t Co Missouri

HOW To Cale? Plan Will Some a Secret Resides Ports as Metrida 25c Jack-bons J.I. Lake Assiste II and New York

Chriffe Mausern Colla! Politi Kantockies West e bes Astique - Modern to a G ressource Su see Bargain Cat-aige on v Mc Astamoute's, Youkers 2A.

Onderto Heads by there Lure parts, it are made Finnisports PD. Toledo 4.

FRRE Below Wholesale fishing catalog Fishing Tackie Mart, Dept. 613, Box 6717 Chinago be th

In our Propurity Wholesale -- Presentation Send Destroy House O Mark Without 18 New Jersey

AMAZING parented combination professe such banker straightener \$2.50 Her man Mirker 425 H Lastin Christoma

5 000 Bight A We Breard & Die War el a cata of for issuith Massum,

WOOLYWORMS, finest spinfishing lure to \$1.00. Description free. Park Producte. 47th. New Brighton, Pa.

NYLON Rope Lipse, Cords, Every De-militus for all Household and Sports-ster, a Uses, Pitest Made Free Catalog Sector Cordage Co., Cranford 7, New

JAP rifles altering American 66 00 Jap thells 63 85, catalog | Shop. Rest Branch 10, Michigan. catalog 50, TP

CAMPING EQUIPMENT

TESTS direct from the afacturer wald a argest selects a Low prices dend her cornel hame address) for 160 page ompione catalante of Tents Camp of Camping handbook Morean, 10-150 50th

17 DOGS, BIRDS, HAMSTERS, RABBITS & PPTH

RAISE MICE Free booklet pen piana. m. sey makers Trees, gate today Laster e Mougard Brig am City at Ulan Ires (ate MEDI II. Law -

RASHE Rabb ts of Mirch on \$500 mer th p an Free details. White a Rabbitry Dela-DERES STATE

HAMSTERS—Golden Young \$3.00 pair, breeders, \$4.00 pair New mutation, \$5.00 pair Adirondack Hamstery, Prospect 13-3, New York

BRED red squirrels, chipmunks thers. Bakh Squirrel Farm Custleton Vt

RAISE Rabbits For Us Profitable An-geras Cricitions New Zen and Pat-ts are Free Orinsteads, Edwardsville, Элион.

WE Pay 13 50 lb dried Gree Mashrooms Cellar shed and outdoors Share full time year round We have 25 500 customers Free Book Washington Mushfrom Ir # Dept 177, 2056 Admiral Way, Scattle, Wash.

HAMSTERS-Ideal Poin 62 S5 pair Pres Soukiet Jer Fre a Hamstery 2425 Host Mustegon Heights 14 Michigan

MARE Big Money Reasing Nutrie. Chinchi as. Cavies. Mirk Rabbits or Pigeons for us Free information Keeney Brothers, New Preedom. Pennsylvania.

LIVE Alligators \$2.50 Postpaid. 'Os-

IB EARTHWORMS & FRUGS

6.0 000 YEAR possible earthworms II Page book et tells how ISC Missouri Earthworth Research, Box C-6851, Eansas C tv Missouri

RAINE Nighterawlers, Redworms, Sollless Method Three Oaks Ranch Dreeden, Tenn

\$1 000 MONTHLY Possible Raining Earthworms, African Giantel Back and Garage. Basement, Complete Illustra ed Booklet, Explains Raising, Feeding, Packing Markeling, Only 2501 Ozark Worm Farm-V, Willow Springs, Missouri.

19 FARMS, OTHER REAL ESTATE

FLORIDA-Nice homesites, \$345 at \$16 monthly. Folder Free. Winfree Verbor. DeLand. Florida.

PLONIDA Waterfront Homes tes mid crate priced for ret rement. M. athly pay ments. Good fian na. hunting. Ad, ina. Ocasa National Porest. Grace Parker, Passley Lake County Florida.

CANADIAN Tax Sais Lands for three do sars an acre and up Small month a payments Parma timber hunting and fishing camps numerous Limited number of properties Write at once for free cats logue. Tax Sais Service. R. am. 1.3, 120 Blood St. W. Toronto S. Ca sade.

FLORIDA Trailer Homesites Water System \$495.00. \$10.00 Monthly Lake Frivlages. Box 2005, Deland, Florida

NEW Strout Spring Catains just out Mai ed Free' Over 2100 bargains 34 states coast to coast Farms. It mes businesses Winds largest 56 years service 4thout Ready, 251 ZH 4th Ave., New York 10

At MMTR cab is sites inside Carlet Park Level, trees, accessible 50x86 excellent little \$200 down & months Free folder Charles Oreen, Corain Mintana

PLORIDA-21, acres. \$15 dono. \$15 monthly; ful price \$695 00 High elevation, pear Gulf of Means Suitable Fairlion I corres positive Free of emalous Frontida Sugable Comet Development Co Brackey in Frontida Dept. PS 2

PLORIDA & Most Decrable Seriuded Plaining and Hour of Remember in New Lake Center Development Burrounded to Lakes In Pamous Panama Cit souf Renot Area Ideal for Sportamar and Family Vacations Only 510 Monthly Socket Pres. Douglas Wood, Pountain, Founda

TEXAS Cabin sites 5 cient maniforth Lakes Piness fishing busting would roads ejectricity Develops g tast Private boat dock fishing per barbecus pits tables as d prince grands free to into where ideal for retirement or recreation Near 3 thriving towns Ever thing you could wish for Two 12 ad 30 to 10 to down 2.00 month write for main physics etc Dept OS 11 PO hox 50 Kings and Trans

RETTRE In California on 1200 Month Beach are or Desert Thresing Comma I the Healthin Complete Beautiful Scene re Good I vestment Opertunities Mail 1 00 for Phitares Complete Information. Weeter Box 405 Heaverla, California.

THEES, SHRUBS, HOUTS, HERRS

RAISE Your shitube, trees from seed Free planting guide, price list. Woodlot Seed Co. N. (782) 46 Michigan

rooted Amorted pine and spruce Shipped postonid at planning time money back guarantee 10 for \$2 25 for \$4 50 for \$4 100 for \$10 Williamerent Nurseries, \$727 Orabb Rd Ene Pa

22 PROFITABLE OCCUPATIONS

\$5000 PROM Half Acre growing Ginsens, etop bought Particulars 10c Associated Growers Spering Man-toba

PREE Folder How To Make #3 000 Year > Sparetime Backyard Rathing Earthworms Outhaven-7 Cedar Hol.

se con FOR Master, Mrs. \$3 500 Free | "Secret Journal Plan Master, Work | home! Publico N44. Oceanaide, Calif

SAVE Money! Buy Wholmale! Proc Catalog General Merchandian North, 687-H Broadway New York

BIO Profits in Weiding Zasy to learn Low cost training in completely equipped Non Profit school CII Approved Write for Pres Bookiel—Hobert Trade School, Box P 263 Trot Ohio

INVESTIGATE Accidents Earn \$750 to \$1,000 month Thousands of estatute, insurance companies steamable since or gently need claim investigators. We train too home space time. Placement roy searnd be at Pree book. Now. No obligation Universal Schools. B2 Box \$302, Decemb 5.

LENDING Machines—No Selling Operule A Route of Com Machines And Earn America Prints 12 Page Calaing Pres Parkway Mark no Corporation Dept 17 715 Ersot Street Bastimore 3 Mary and

PRES Book 505 Odd Successful Businesses Work bothe Pacafic--17C Oceanaide Canf

VENTURE financing A pocket guide to modern methods of financing ama' business the Unit to business men battlers has ere slid accounts to Bend \$1.00 re lubdable. Business Publish and \$20 jat Ave. North heat is 8 Wastington.

PRFE Literature-Make Big Money Rains g Plat a cities and Crickets Carter Farm 10 Place Cia

\$60.00 WFFKIY sparetime case Home Vere and H d Laurid. Free Book Burtt 24142 X W Firm 1 Kuttana

LEARN Invisible Rewess of At Home Free Details. Ja E.s. Service. P.O. Bux 1451. Presport. It nots.

PRECISE N Sharpen Schwers Sollie Pinkers Lang Despendire outfil Rockhank She dam Luna

WE Pay \$1.50 is dried Grew Mush rooms Count shed and outdoors State full time year found We have 25.000 rustodiers Free Book Washington Mush room Ind. Dept. 101, 2934 Admiral Was Seattle Wash

FREE Book 990 Successful Little E of the Brancases Wife home From out h 1810 A 43rd Street, Brookish 4.

HOUNEWIVES Others \$30 \$100 Week ly Assembling Fre Pillabed Rockbund Jewelry at Hume boate Time Pres Denn a Value Dept Ja Box 2046 Ingresoud Co.st

WHOLESALE Thousands Name Brand Products Pres Catalogs United Wholessairts (1657 Broadway New York J. N.Y.

\$30-\$60 WEKELY addressing envelopes Instructions \$1 refundable Reiss, 210 Fifth Ave. Suite 1102 S. New York 10

Bit Y With serate Over 10.000 Nature to Advertised Products A, a en Cameras South g Goods Housemares Washes Thewarters Tools Continue etc. Soud Posts and Today Huy-Rute Box 256 Haw there? New Jerses

PRIKE \$5 000 \$45 000 Unionited Vara tions Wirk hims No her hand se equipment' Haylings-PS. Carlabed Calif

BOOKS & MAGAZINES

PRITISH Book Rangains Any subject Cats of free T anabuoks, Box 1 PSZ Wa sagh New York

OCOD Used Books, 50c-81 Free Lists Editions, Dept. PS, Hempsiesd, New York

Will used to buy old copies of Picturar Street no passer from period 1890 to 1945. Condition but too important prised ed bushs are complete with he pages removed. Write to Box No. 208. Tuckshop New York.

SPECIAL 30c-21 Page booklet-"Your Aquertum" for 15c Innes Publ Co., 12th and Cherry Sts., Philadelphia I, Pennsyl-

NATIONAL Geograph Magazines 1888 1952 Ant time Per ideal Service Box 665 PS Wimington, Delaware

DISPUSAL Sair Sew-used books Last free Extra Spe at 10 bricks in iding 4 grant marks \$1.00 only, Persit, 426 M T Ave Brook on 25 N. T

BOOKHINTERS At Subjects Send Warts Jaher Book Service 183 Base, wood Orive Westbury New York

PREE Copy Handbook Useful Tables Franks, 1121 South Rector Chi-

FREE Book Catalog Many Interesting Subjects Books Publishing Co., Amilyvitie 19 N Y

"WHAT A Male Teenager Should Know 35c Hauseb Enterprises Box 2103 New Orleans 29 La

ATHEIST Books, Catalogue free, Truth Seeker Co., 35 Park Bow, New York 6

JOHN Friend, Book, ader, can get the books you want Free Search Service Box 2570PS Long Beach 1, California

HYPNOTISM

PREE libestrated Hypnotem Seifhypnona Cata orus Write Hypnotist, \$721 Sunset He wood 46P Caufori in

BEDINNER & Hypnosis 11 astrated, \$1.00 Moneyback Guarantee Baltamore School of Hypnotism Dept \$20 Box \$220 Santimore & Mar land

HYPN 17.2k Successfully Learn Rasy Past Modern Methods Complete Liturtrated Course, including self hypnosis and Secret Nerve Pressure Technique Guararteed Harmess 1, 00 H howler 430 D. aper Ave. Schieberundy 6 New York

ARE you esting yourself to death? Hyphotically helpful record teaches fatiess det 5 00 h Orsuer 219 Fifth Avenue. New York at

PREE Catsus H pout sm Autobyrnona Books Tapes, Records Drawer PS607 H idosu, New Mexico

LEARN R protiam our book 25 lessons in Haptutism socks how to arbieve business as d sortal success 41 postunid Satisfaction guaranteed Books Publishing Co. Amitos, ie 28 New York

EX Har Mind Hyphotise one gance Outsideed 2:00 Waterstrar, Box 16. Ottery Cape South Africa

TRLEVISION It product Emple Pranchel offers comprehensive himse study course is produced and autosuggestion for an future resement. Examination and certificate. No gadgets—no extras. 6134 Wood-man Van Nuys, California.

HYPNOTIZE One word One dingermap in stage Sat sinction or reford 43.00 Sect-bond as Lamb bythe b Tech que 12 it promisers, \$46-HS summed Chicago 40

24A GAMES & ENTERTAINMENT

USED juke boxes, pool games \$100 Hill records 30c Catalog free. Wickens, 1128-W Submort Applicatio William

MAGIC TRICKS, PUZZIJES PTC

WORLD'S finest professional magic Joker novelties. Giant Illustrated estains for Top Hat Eva aton 11 | 1 is

3100 NOVELTIES, Jokes, Tricks Gadgets, Punmakers, Hobbies, Big catalog 10c Jahnsen, Smith D 421 Det. at

ONLY the brings you magn's greatest to or Douglas fathous Cuta of 500 Teb ks. Tribs for an atour and , described for or at atour with basis is cards eightettes in an apparatual of a card cignrettes in an apparatual for each service to pungletiscal everywhere for every 10 years. A large our frields send be today Douglas Magiciand Douglas Douglas Magiciand.

Book \$1 00. Catalog loc Book Box 671, St Louis 1 Missour;

81.NKB(MM Dispullingly potent 12 8. Kits 1652 G Drake San Pabio 40.

VENTRILLO Professional Voice Thrower and Catalog 25cl Box 271-P8, Pl ade ph a 3

SENSATIONAL Marietap a Wa d (Vanishes Handkerchieff) 25c rain of included Box 1353-PS Pi Hade p. a 5

RMORFHOMBS 25c 7 for 8 00 (Ter-

2001 AR Magic Set Pres with Catalog 25c 4467 PB Germus town Physics a WHOLESALE Thirts Do Trick Nivel-

WHOLESALE There be True Novelties \$1.00 Profile | 1746 SW Market, Philade in 3

229 MAGICIANS Secreta Variabling Cards Magic Ca used no for 35c Ward a. Box 301 Jackson He ghts 72, New York

STINKBOMBS Potent Aroms 12 81 Kits, 1452 Drake, San Pablo, Ca.

H NECK) Rope Masters and Cata of 25r Horus Porus, 317 North State, Jackson, Mississippi

pictely illustrated estalog for. Stowall's, Woodstock. New York.

COINS & CURRENCY

OST Profit and Pleasure in collecting old coins Send 10c for 56 page illustrated coin catalog You'll be de spied with it Send for it now B Mas Men. Its Mehl Building Fort Worth Texas Largest rare com establishment in U. S Established 55 years

COINS from Pormona Vatican etc. plus foreign banknote. 10c with coin approvals. Littleton Coin Company, Littleton &3, New Maker subterm

PUREL IN Coin Barkriote and large ! hastrated cosh ast for it passage Bar-ga na Indian Head cent like Wooden N kel like Chinese De ar like Appropria the ided with ever order Tat an Co-Company Springfield 50. Massachusetts.

OLD and new U.S. gold come bought and soid, John J. Pirpo, 126 Santa Ana Ave., San Prancisco Zl. Calif.

PREE OF Freely notions consister wants our Free circular Write Rheike Wenus. li lisela

WANTED! Coins Habest Paid! Confi-Sential retains \$1. S. van a. Enda.ott

WHAT are your coins worth? Amazing Pells new 1858 L S Cota Book by Jacques De. Mc te Everything on meets alo rie coin minted—worth, value, how to sell, speculating investment, other valuable facts (withhard to show the set of the money flay postmen \$2.00 (p.us postegel or \$2.05 postuald (refundable). Frail Principlers, 386 J2, Pourth Ave. Warte .

1985 MINT set heiltiant select uncircuhated P-D 6 12 please \$2.50, 1056 proof set \$3.60, 1557 proof set \$2.50 mint sealed Thomas Lavin, \$751 Paschall Ave., Phila PALL A

WHAT pickel to worth \$1 500? Sejul 25c for intest book showing values of rare American coins. Stack 8, 133 West 57 St.,

Of D. money wanted Do vis Store that Cutn Courtains pay up to \$180.00 for ref-tate U.B. Cents. And high pressums for dis rure rottie? We buy at diside Sould Sc for Large Coin Pt der Mar mean much profit to rea Numismatic Co., Dept. 36. Fort Worth, Trans

INDIAN Cent plus Barga n Liars tor Mulchanson's, Box 4141 Philadelphia 34. PER MA

FIVE Brilliant Unclrudated Coins and Plastic House Last Year 1954 of Com-picte Mintage San Francisco Mint. 53 50 Postpaid. Louis Bell, Box 1875, Decatur, A PERMIT

COIN Magazine, 160 pages, Sample 25c Frimismutic, 7330 Milwaukes, Chicago 21

COMMEMORATIVE Half Dollar circulated \$1.00. Bargain Lists Free Say-ers, 1000 Unaka, Johnson City, Tennessey

RAKENT CC Mint St ver De ar 1865 Unit vilated \$3.90 Co.m Catalogue Sac Shults, Salt Lake City 18, Utah

00 ASSORTED Coins. \$2 00 46 Amorted Wills. \$1 00. Oddehon. Box 482, St. Louis, Ma.

COMPLETE United States coin barrain heis Indianhead cent, 16c Economy Sales. 156-B Dean, Manufield, Massachusetts

LINCOLN Cents 1918-8, 1913-8, 1921-8. 1921 8 1814-8 all let \$2.00 (cased a Box 348 5 Los America 34 Ca. fortion

SIX Different Indian Cents 50c. Three Cent Piece 50c. Half Dime 75c R & M Coin Co. Box h Decause Feet Jersey

M DOC OR POH 1823 L berty Head W Rel Uncirculated Dollars 1806— 849 1893 8 1895 P 1802 O par \$100 00 gs 950 80 cer-ta n Dates Line in Certa bef s 1872 -\$ 10.00 Pring Fagur Cr to \$500.00 In-d at Centa- \$148.00 Drives but to \$48 \$1.000.00 Q arters bet to 1924 \$ 000.00 Fig. 7 200 % a before 1805 \$1 200 00 3e Pierre- 8 70 00 3c Pierre 8 40 38 Raif d res- 8500 00 Mured eda of cit eta werth 8 0 00 8, 850 50 Ca adran C cit = 19 It :he Sayer \$ 00.00 at 5 Granters 47 at 192, the -5010.00 Warted Ste Pieces 197. Cold Curis Paper Money etc Our La se L'astrated Custantee Buy na Se lur Calangue that of Complete Asserts lafer h atter send at 30 Fu chase Catalogue before sending coins Worthvools Corne-ration. E-400-C. Boston S, Massachusetta

BAN Francisco Mint Closed! Made only certis and divies in \$25 in their supervised division. One each, britished un-errorated in the Free or a new with order Brisin Colm Company 413 White Toledo B. Obio.

FLYING Eagle Plus Large Cent El to Rhode, 105 Wi door Meading Pa

12 DIFFERENT Ind an Cente and Core Last no y \$1.00 Pour site. Box 2317 Murth Winder Perint Antonio

WHOLESALE Coins for dealers, investors, Lists 10c. Al Johnson, Box 25, Colorado Springs. Colo.

SILVER Dollars: Uncirculated 1990s through 18950 \$3.50 each. 1893ce \$15.00 Retail lists 19c. Holden's, Garwin, lows.

CIGANTIC 32-Page Burgain Catalogue 2 \$1.00 (Deductible on \$10.00 Order) Incian Cruts-15 d Servet \$1.50. 25 different \$2.35. Guidebook \$1.75. Past Berrice Bebee's, 4514 North 20th, Comaha 11. Nobranks.

LINCOLN, Indian Cents, All Dates. Principle 25c Penny Mart, CK-11, Box 420.

ONE Matton Dollars Authentic Reprodutti me at the anne Confederate Money to \$ 0 a \$30 s \$56 s \$100 s etc octs \$3.00 L mit Peur M toet for Oris \$10.00 Best hause Cumpany Dept M 237 461 Market fit ret Newarg New Jersey

12 PAGE deluxe U S illustrated coin hat 25c. Stoney, 192-S Washington, Boston &

PROOF-Sets. 1956 Set Only 12 56, 1957 -83 80. 1956—84.00. 1855—86 80, 1956—67 00 9 F 8 7 00 1952 \$16 00 195 \$28 00 1810-84" 10 Complete bet 1950-956 fzruntro- 6 20 00 Postpaté Pricipt Stip-ment Miss Hail Crista for Dan's Iran Moratka ANA 612 S 22rd Ave., San Prancisco 2: Califotia

DID STAMPS WANTED

I Will Par 8 40 m each for 1924 to green Franklin stain is rotary perforated eleven tup to \$1000 bit each unused. hend 30c for Large Il otraced forders showing Amusing prices paid for ald atamps and Buker-Stamps, (66-P6-26) Orndell, New Jersey

STAMP COLLECTING

TWO 65 86 UN stamps plus 39 different. the nicht LS negetorate frute blamp Co., Then 1, so Brook a so New York

AMAZING OFF 300 US stamps that a commencent see already high decominations to \$1.00 andy to in Ap-Proval App canta Historical Bargain cats free M vis Stamp Co Dopt 36. Camden New York Cathden

ICELAND 10 different beautiful stamps for only 16 conts to applicants for our food old fashloned approvals. Old Colony Stamp Co. Dept. B. Milford, Corp.

LHITTO States commemorative collection containing if a first to life Approvals. White, his W Avenue L. Brooklyn.

WEIRD Diamond those Coffee Stamps Lough Firmer Triange First American big commer wallve circuitand Shat Danc Free with apprirat Capital Stamp Co Ferrisburg 16 Michigan

230 STANCIS For solv loc This man-moth value includes Atres to Pictor at Planne Irom atrange Countries catalogy ing up to 25c each Also Approvate Mrs-

PREE! 107 British Colony Stamps Al! different, from Britain a larffung coam'al emptr Catang takes 12 to Free Stamp Magazine A. covain Send the for him W Art town Bragara Stamp Co., St. all erice s 72 Octable.

SEE DIFFERENT would wide stamus let a th a prevale Littleton & sme Community Lattleton 12 New Hampeline

FREE Amazing List A phabets at Two

on Diffrentered Come 10r with approved Plymouth, Dept. A-1, Seil, Calltota s

WOW 118 At Different Germany 10c Zeppedile, Semi Postale Airnis a Rich values, etc. Olant Catalog between threincluded with beautiful approvers James town Stamp, Dept. A2178, Jamestown.

FIRST UN. Set. Among World's Pret-tiest. Only 18c. Approvals. Welles. But 13cs V NYC B

too D.PFFRENT Stamus 16c with apprivate Smith, 164U Brooks College Blatem Teras

At PFRICER weldende tristen mestere Amazing variety! Helf pound \$1.00 post-peid Nay Nielsen, 45454 Harvard, Mont-real 28, Canada

TEN Israel, Pree'l Popular-Priced. At-Part of Brett Misses &

PERNY Approvals. Thousands. Bargaine for pennies. Outta with purchases, Penny Stamps. Orange 2. California.

to not STAMP (45 Bags, 25c each, Auderson block to Reading Pa-

PRFE Grant Bargain Catalog New Ed son spring three saids of burgains in a set of grade and BFA stances southers matures solves accessories and may be sent with beautiful approvate Jamestawn Blades, Dept. 2225 Jamestown, K.Y.

STAMP Collecting Outfit, includes packet worldwide stamps, package hinges, wa-termark detector mill meter gauge Every-thing for with approvais, Lorrain Brown, damed will do and

PREE Eight Eded Stamp, Triangle, Dram-rad M dget, Mammouth to appr val Enyers, Downey, Box 78-B, Bell, Cali-

TERRIFIC Stamp Barrato' large! Ice and—I alread Asserts ent plus en the triangle set A so facustian British Co senisi A communication. Plus large stamp bridge A four offers free field for to rever prefage Empire Stamp Corp. Dept. PR. Infor o Capada.

LIBERIA Beautiful set of four pative Sowers, priced at 40c in Standard Catalog luc. Approvals. Goliath Company. Bethiehem F2, New Hampshire.

163 POREIGN Stamps, including Pakis-in. Scandinavis, Newfoundand, Australia. Africa, Russia, Japan, China. Oddi-tica Russiae Or 5 With Approvals. En-tande Or for 1 and 1 in Lincoln Stamp Compose St Catharine 219, Ontario.

312 MARPH C & or 24 the to Civid Hug get Approval applicants Mottung this them Keene a Bus 614 Turnets Actions. Wolfrang Han

Picke Mint S tiath Colonies from Buries Free with approvals. Viking. Great Noch & How Tork

PREE-Stalin Clant "Iron Curtain Bet Approvais. Seminoles, Dayton, Tennessee

PRES Stamp Collection 100 different stamps from Surope, Africa, Asia, Scan-dinavia, Backans, etc. 30 to approval ap-pleased To am Stamp Company Springfield 10 Massact unelsa

US Stemps Grant bargain catalog-

Its USED United States commemora-trus-mans obsolete Bend \$2.06 Lincoln C.b Bet 211X Chatham New Jersey

1956 C' ft. Price Lint 36e Bewin a. Bon 796 Parkfied Lisbote

DIAMOND Removelt Pops Triangle.

Ocean and Angria 31 others for Approvale Lengthers, Box 1064P Lubbort Tex

CUBA — 26 atferent 10c, approvals

Dopke, 3482 Laura Lane, Riverside, Calif.

PRES 15 different Manchukus, plus

Word a only Ortagonal stamp plus Abrasina Red Cross set to those requesting appearance C A Cleary and 800 North Rumputer Oak Park Il tools

Fight Valuable UHA? (1) Brayes generate postage stamp picturing first UNA. Saused to 1862 7 Hig opertion 30 all-different U.S. ancient 19th century value. benchife, Commemoration (d) Colection Ciu de Big de page Bargain Catagos in-ud is al UR Postage Issues other et las offers Bend 10 for masting ex-penses Hattiero, 4164 Transit Bals Bonton LT Muse

The Pres book. "Bow To Collect Star a " Send for your copy today! Au-

DEALERS Wholesale catalog. Postage 3c. Pranksco, 3031 Quemebury, Baltimore

18. Maryinud.
RHODE: 4 None and Stamp Macture or E | Roon 736 E Cutlage St.

PONY Payress Contracted Prest Day Corres Send S amped Self-Addressed E. -reads for Deants K by 1427 Pennsylva in Deriver 1 tok-rado

APMIT two dimes for the best U.S. afailingue rous have ever recursed. New Way Diamp Lawrence, Mass.

OLD scarce U B, seconds on approval Slightly defective, bargain prices. Hearn-feld. Clintonhill Station, Newark 9, N. J

PF-SF Tangati inn Restain Nurria-Madeganial Cameronea Chandrast per-Rhodes a Stanzand Caude a M or-to Cremist d Try and Green a with Approvals Send to Postage Thrifty Stamp Company, Woodstoor, Silver Spring, Marylaced.

GIANT Approvals, Thousands Different to and 3c each, Wahl's Stamp Exchange, 7008E Parragut, Chicago 31, Iti.

FXCITING "Strange countries" packet Pres with apotornia Bason, Orange, Cad-Cornte

NEXT ten 3c FD Arteraft Covers \$1.00. Aufderheide, Box 234, Trenton f. New Jernes

CANADA. Queens, Wildhie. Commend-) ratives, Recteation set, 14 var., only 15c with attractive approvant Rheaume. 4561 1.th Ave. Montreal Canada.

PIFTER US Commemoratives like approvais included. Unique Box 494. Approvais Australia Australia

FREE—Armails, Commemoratives, Pictorials, Approvals, H. P. Wischarl, Frankfort, Ohio

200 DIPPRIENT given free with apprivate Partico are Postage 3c Windows Stamps 6834 Cornell Ave Chicago 17

PENNY Approvate Jammed wit Bergains For better values try Putnam Stamp Company Mahopan New York

ECONOMICAL 19-30 Approvals, 33 000 varieties Dresel, Bux 128-T West Engle-wood New Jersey

1800 STAMPS. \$1 00. Good variety On and off paper World wide. Many pirtorials No approvals follow Satisfaction guaranteed Whalen, 1435 First Ave. Oakland # Californ a

QUEEN Elizabeth Mint Setal Barbados Virg. a. Trada i Gibraltat Domain a Maita 21 Bactors 28 Altractic Adprovasa Gannon Stamps, Box 83; Cabton a Ohlo

(CELAND, Surinam, Curarao Trimdad Transyani, Free Interesting Inexpensive Approvata Follow, Cedar, 1008 E. LaSaile, Barron, Wig.

BRITISH Colonies, 100 Different 10. also Free Albuma, Catalogs for Purchases Approvas Count. P.O. 2187M Santa-Ann. Uniforcia

ONE Provid General Poreign Stamp Misture \$2.50 Vers at Prack School 225 Market St. Perth Ambor New Jessey

FREE United States Commenceative Last 11 5 45 Bromited, Buston L. Man-

100 OLD U.S. Stamus between 1861 and 1933 \$1.00 Housely Blamps, \$1 Chestout Managerd Ohn.

First Sample, Litestrated, informative. Interesting National Stamp Fees Ander son, South Carolina.

PREE List Bargs p Collects de Merke, Station 10 G a desew South Hadsey Fa in Massachusetts

PREE Surptise Assortment, 50 Different World Wide, With Attractive Approvals, P., at Prices, Banner, Box 65-A. Park Forest Illinois

U.S. Caramein stative Pirst Day Cover Free with Approvals. Arrow Stamps, Box 2575. Oklahoma City E. Oklahoma

WONDERFUL Offer Seven com, sete mint sets only 10c with approvals. Retch (826) 1032 Lawrence. Chicago 40

PREE 100 Different Stamps with Approvant Jeona Stamps Dec. Pri 47 Ever green Road North Firt Myers Florida

FREE! Red Cross Triangle 26 Others Approvals. World. Box 1762. Wheaton Maryland

512 DIFFERENT 50c, 1025, 21 04 Approvals, Knowlette, 603 Jefferson, Englishment

PREE San Martino Mizambique Carcho-Biovakia Austra la Argert a Apprica a May Box 186-K, Coral Cabira M. Fiotida

DANADA 100 different 35c with bargain approvant K & Houres, London Carada Quality Approvant At 30 Sach, Had-rian 22 East 29 h New York City 16

404 DIFFFRENT Stamps 25c Caps Good Hope Triangle Huand Urandi, Jungle Set It uded in Trylon & Super Collection. Cata aga over \$12.00 Approval Applicants Day Trylon. Box 178-8. Forest H as 75 N Y

100 DIPPERENT Austria 10c Apor vna living Archon Box P Newton Centre 50 Massachusetts

FREE! 30 Different, Approvals, Ehrlich, 426 Jefferson St. N.E. Washington 11.

KOREAN Set Free With Approvals W B. Stamus W lice Berry Po.

DARKEST Africa Congo Camerouna. Reyche ies Sware and. Ta gar ha Ur u. d. Free Fasc aut of Approvant Royand Box 200 Forest Hi is 5 N Y

PREE Pictorials to Approval Applicants. Phis-Cob. Box 302, Chatham Mass.

44 WORLD Coats-of-Arms in Color, 10c With Approvals Monumental, Box 3507, Baltimore 14, Maryland.

16 000 DIFFERENT Amazing new plan bullds your rollection systems test y country by country On y 50c weekly Pres details. L. O. Ware. Stepney 19 Conn.

100 DIFFERENT stamps, 10c with approvats Finnes Box 50 El Monte Canf.

SPUTNIK The World's Pirst Sputh & Stamp Plus 50 All Different Free With Approvata Samp Imports, Peterboro, Ontario Canada

US approvabl Low prices Eagle Stamps, Romine Ave Pittsburgh 26 Penn a

JAPANESE Commens Bi-Colors Parks
14 Color of Stamps With Approvaus Only
10c Norton But 926. Sain Automo 6
Texas

1840 OREAT Britain Penny Black, Caln a co 6, 00 S er a 61 00 Approva a B sea 2121P Avenue & Brookern 45 New York

UNITED States Flor Mint Armalia.

CT ZC4 ZCF ZC 0 Di 5 01 25 Approvata accompa i Whiton Paine Westport 12 Concerticut

FREE 25 Inflerent Pi torials Approvate Marford Box 48 Queens Vallage 26 New Y rk

250 U.S. Commemoratives \$1.00. Wesley Road, But 235, Cedur Rapids, Iowa-Lt EMBULEG 25 D Frent 5: Appr vs 3 Neer 5050 Tower Riveraids Ca Arctic

PHPE Stogapore Bornes Sarawak Non-acid Tagatistha Putotian 50 Hatio 6 Approxima Murraya 2020 Rade macher Detroit 9 Michigan

40 000 VAR ETIES Ava able on approvate his openeds Keignan Box \$11() Day-tons Florida

25 DIFFERINT Commemoratives 10 3 op 10: U.S. Approvata K & B Box 10. Brook n. 21 New York

500 WORLDWIDE Mixture Big Variety 25c Monjar, Pairmount, Cincinnati 14 Obje

FREE Pak stag Malta Serchelles Bermuda III des a Itaq Differes I hars epats e approvant Mattenaga Box 005 Philade pla 5 Perha.

Parks camp 5 20 Ed Heija Box 345. Ross oke Virg in

COUNTY Stamp Market, Box 210. Titusvide. Plorida.

co DIFFERENT U S including 36 Commemoratives 25c No approvals Seid-enberg, Appleton, Wisconsta.

EGYPT 25 Different is Postage, approv-

thes the Approvate Wecker and 1904! Choquetle, Austin 5, Teams.

FREE 15 Mark French Colonies Interretag Appriles Accorded Tropicana Bes 624 N Onemand Park Fig.

K ast is Stamps Fa. fax, Vermont,

I N TED States Catalog Proc! Balley States 45 Brumheld Boston 6. Massa-

123 DIFFFRENT 19c for iding African Quee a Approva a Krehe 1/06 S Nebrasta Orlande Florida

SELECTED Fine Stamps on Approval Bee are at Ad anced Wilson 5028 Onstead San Diece to Card

Pack K Sent Driver's Licerae Stamp

FREE 50 1 B and Forego CSAC Mit: A Gusernor Printe Warmington 2 Decayare

NOW Try Profit Sharing Approvals Dietze: 130-36 116 Street, Jamaica 20 N Y

JAPAN Scarre 1000 Cat \$, 50 W th Appr vals 13c Benezra, 3530 Pacifing Ave New Y ck 69 N Y

SCARCE Source of Sheet Free With Approve to the ett Stamps Box 90 E New-ton Highmands 61 Mass

SPECIALIZING Old U.S. Famous Americata Flaga Presidenta Commemoratives Approvals Plus Surprise Parket 10. Hand or Metropolitan Stamps Bux 1,200 Jackson Heighla, N.Y.

NEW Pres b Colons Set 10c With Approvate Brickman 4241 Live Oak, Arca-dia Constornia

1000 a STAMPS Free with Purchases Details Stamp Farm Oxford, Wis

SPUTNIK commemorative and other out of this world stamps—San Marino dogs flowers. Chaco heroes Angola contumes On't like Pree albums estations to our approval busers. Bell Stamp Service PS-2. Bell Cautomia.

1 000 DIFFERENT worldwide with Approvals. Alfred Jacobsen, Crompond, New York

UNITED States 1948-50-51. Used Commemoratives Complete' Regular 85c—Now 29 Approvals Peterson, 485 Empire Bank, 5t Paul 1 Minn

I AND 2 Cept Approvals in Envelopes Behausbeigh, Columbia in Ohio

DELUKE U.S. Illustrated list free Stone, 182 Washington, Boston S. Mass

QUEEN Enzabeth 50 Different, 25c. Approvals Accompany. Yokuma, Box 1127 San Antonio 4, Texas

.000 FINE Mixed U.S. Stamps 25c. Wright a. Box 1122, Hagerstown, Maryland

U.N. five different 10c. Approvals. Anderson, 1112 Rarrison, San Francisco 3,

IF you have a product or service that can be operated on a mail order basis arite me today I will send ou a Free K to "How To Make Money Out Of Classified Advertising" Next take will be April Closing data February 21 Rurry—Do it Toda O K Ke s Classified Adv Mgr Dept 28 353 Fourth Avenue New York 10 N Y

ANTIQUES RELICS &

11 I INOIS - Cena dheit For Base Bundreds of Harry a Revolutions, a Call war Indian Maketa Carbines Ries, Baorda Rasmeta Fowder-borns Bigt Mids His as Caltrera Kerlucky Ries Peppe biast Due ong Palis Biageroush (a. a. 50 000 Codectors Cartridges Confede at terms. 1,0 000 is due Rela Colina Agates Foss a Mirryl his mer Afronseads Toronshauks Bosse atoma Mirrela Dechada Steri, as a Vision Wand Richard Problem Cartridge Catanog Dechert, as a Vision Wand Richard Problem Carte Durantes Weborn I, pools

THEFE Arrowheads or Two Spears at 00 Krafe Drid Scraper \$1.00 Palmer 435 Washington Road McKeesport, Pennsylvania

SCALFING X 110) War Arrowheads 33 00 Catalog Free. Arrowhead, Dienwood, Arkanasa.

SELLING 100 000 soment Arrow, ends. Sprannends Tomabawks etc List free Leurs, Commond. Arkumas

BATTLE Relica, Cannon Balis Coins
Silverware M Scope Locators Find Lem
Newest features Terms Cuts on Pisher
Research Dell C 2 Pair Ada Cabi
10 ARROWHEADS \$2.00. Orgoved Stone

Warriub 42 00 Last 19c. Stan's, 1954

MINERALS & PRECIOUS STONES

Specimens Attractively Board with de actipitive Polder, \$1.00 properd included free dinosaur Bone pocker piece Rick Haven Mineral Co Box 125 Whiteheld, N H

LAROEST gem and mineral magazine to about to base profession of with rocks sems, levelry Monthly \$2.00 year Sample 15c. Gems & Minerals, Dept. S.3. Mentone to profe

BEGINNER'S Mineral and Oem Study Sets. Free Literature Mineral Lore, Box 156. Del Rosa, California.

HOOKLET Panning Gold for Pleasure—Profit " 61.00. Wendt, Troy, New Hampshire.

DEMCUTTING S. vercraft magazine Lears to of gene make sewers Ade give four en equipment general relaters cuses are free literature Sample out 25c handary Just a Del Mar I Castistia

Maga le Subse pior 1.00 bampie 354 Box 1.5 PS Chicago (10 1).

TEN N Men Minerals 23 50 8 Phoresorner \$2.00 Pive Crys alived Minerals \$2.00 Focus Coul 25c Hartson Winston 5. New Meaco

SAPPH.RE Topse tourmstane garnet periods 2 ve u cu gem specime is 3 00 Ten poi shed gems Buroque shaped 3: 00 Pice he gain is jewely gems profitable casy do-1-yourself projects O Brien s 5116B Walcox, Hollywood 38, California

URANIUM Ore Two Types, Taconite with concentrated Pellets, plus Titansum, Pive Specimens \$1.05. George, Eisner Avenue Shebo; gan, W.sc.

nountin, collective

profitable to bby Write for complete particulars. Institute of American Inventors. Dept. 30-E. 635-P &t. N.W. Washington 4, D.C.

BRILIANTIZE tleans report wiver gold instantly Safe for proof coins, \$1.00 prepaid. Stephenson's. Box 435. Ames.

lowa.

WANTED — Cigarette, tobacco carda. Write C atter Ris East Date of Pe to CVI LECTORS Matchbook covers 100 Different at a cord 5:20 Catalog La A ball. \$2.00. Charles Edminally, 1311-P East 84. Covein d. > Office.

A NEW World of Pascination and Enjoyment With Micro Organic Crystals Catalog 10c of Send \$1 00 for Samples to Hiklin Laboratories, Bux 3305-S. Seattle.

TRIPPICAL Plats Co or Partures 15 Seccles, Send 10c Maracle Filter Co Box \$126-J Long Beach Californ a

CIVIL War Soldiers for the Dioramist 22 Hautrated Pages, Catalog #10-E 35c Bussler Ministures, 40 Howe St., Quincy 60, Mass.

23 PROTO FINISHING, PROTOCOPIES, ETC

12 EXPOSURE Rolls, 39c Jumbo prints Guaranteed work, one day service, Lincoln Studios, Dept. L. Box 13. Lincoln. Nebracks.

PARTICULARY S J. mb.s. ser 12 50c Special: 25mm, 36 exposures 8 25 Intro Offer, Plant Polo, But 35M. Broothu 6

PRET \$27 introductory enlargement with foil Pipest que to Jambo dated put is in handy super pake. I exposures Big. 12. Sốc Complete color processing Big Discounts' Write Chobe Photo, Dept. PS, Box 2508 Rt Paul, Minnesota

PHOYECA-RAPHT For Pleasure or profit Learn at home Practical Sade training Long established School Pres booklet American School of Photograps v 845 De terser Parkway, Dept. 1742, Chicago 14

a little it service on deluxe jumbs prints

8 Exposure roll developed and 6 jumbs
or ris etc. 12 exposure 75c. 16 exposure
75c. 15 print 30 exposure 75c. 36 exposure
61 25. Jumbo Derkledge Reprints 60 each
Contact prints made if specified Bay
Photo Bervice, P. O. Box 210. Oaklang.
Canfornia

33A COLOR PHOTO FINISHING

PithE Come Print Coupum Professional Quality Phiacht are Acastational Princes, 2 81 00 Kedas Brance 8 25 Write for Matiers National Coupum Corporation Box are 5 2 Avanta 6 tos

23 MOTION PICTURES STIDES BOX NO EQUIPMENT

PREE Catalog les à 100 à 12MM Pt ma Internationes Protes throngens New York

MOVIE Camera Pitm 8 mm roll \$1.56 18rins 100° \$2.00 Pres processing Better Films, 743 New Lots, Brooklyn M. T

MANE M. Gustanteed-fresh color, beew movie fin tenn, 18mm Free calends, Eso H 4.th Holly, Kansas City 12. Mo

Pitics entaios. Save 663. Petch Smm.

14mm E&W and color film. Home processing equipment Superior Bulk Pilm Company, 443-448 No Wells. Chicago 19

RECOMPTER M.F.: Free catalogue Caratago 1.5 E 66 St NVC 28

PRFE! Blackhawk a big new 1938 sale rate a new a d used the m fir m at a med projectoral Biggest stock in USA! Cameras a res res supples too Blackhank Films, Davenport 15, Iowa

TAPE recorders, hi-2 components, tapes Unusual taura Free Case of Dress, er 60-02 174 Street, Plushing 65, New York,

WORLAS Largest P.m Melection Fratures source new sted Case e Off a 4 14mm a sent Source Free ba sain by c Un specify same Perfess Lafrett. 4158 Levinston Avenue New York 17

25MM Score Tourist Interest of the World For Select max 10s to Lawrence P Helm & 17041 Aprela Street, Cultur City Coast 15ta

18 MM Sound Features \$15 00. Shorts \$3 09. Bedner, 5300 So. Taiman, Chicago

COLOR Slide Sumples 250 Free Slide News, Eddings, 8 Roberts, Corning, New York

for Automa, Carterin Trave, Conedes Bend & 00 or \$5.00 for Six Assorted. Movieland Films, Inc. 16121-S Sherman Way Van Nath Cast

MICHIGAN color slides. Free Catalog Riawatha. Box 56PS, Ypedanti, Michigan. 185th Smyod Phine, Bundreds of Titles. | Lists Pres Crawlers, 613 Page, Pt. Worth 10 Texas

16MM Sound Pilms Sold Exchanged. Duquette 27 P Show 2 t httarg Mass

M CAMERAS, PHOTO SUPPLIES

PREE! Free! Send for your new 52 page Photographic Bargain Book. Over 5.000 new and used items at huge savings For your Free Bargain Book a fe to Dept 412 Crafes Camera to things

PHOTOGRAPHY for Pleasure or or it Leads at rime Produce, basic training Long extablished action. Free bickert American 5 hard of Photography 8 5 Dr. 101805 Parkney Dept. 1722 Chicago 16

SAVE up to 20 on name brand came rat and accessories. Import 1 or own Write for details. Helex, 7819 Greenwood Avenue, Washington 12, D C

KODAK, Bell-Howell, Discounts to 46%, Photo Equipment, Appliances, Pres Cataiog Matiers Mark, Box 125-P85, Pelham, New York.

LF C4 Contax Witten Make a Factor Al ending Brands Trade Buy Set Pice Catable Weste Mr. States Wall No. 1 No

36 MUSICAL INSTRUMENTS, HONG WRITERS & RECURDS

WANTED! Poems for musical settings Write Sonswriters' Service, Clifton, M. J.

POEMS Wanted Por New Mongs Sp. 6
Proma Proc Evanuation Immediate
Consideration State ra'ts a 2736 Arcade
Station. Nashville. Tempessee

SONGPORMS and lyrics wanted. Mail to: TinPen Alley, Inc., 1666 Broadway New York 12. N. Y.

Statis WHITCHS Protect your silens Held at porms bodgs Wr to the safe ver rest procedure floor Service Dept. Ph. 311 W 34th New York 19

PORMS narted for new songs Seed positive Immediate consideration Crown-Manac Company 48-P West 22 Street New York Lity

1856 ACCORDIONS Direct from impediate-same 50 and more Pres trial Lifetime quarantee Trades accepted Pres Calaing Wate According Manufacturers Outset, Dept. 200 2003 Chicago, Chicago

AONOWRITERS Recording Consuma Wants new songs. Royalty basis. National sales, promotion if selected. No charge for melosten fiend material Music Mukers Dept. G-32. But 1567, Mollywood, Caul-Juresa.

PLAY guitar and mallument transported abortant courses to 1-df Proc Catalog Staff School 10 S. Bradley Beach. H J

AON: WRITERS — Outstanding, ethical offer R bbeier, C-12, 4000 Oleander, Chi- cago 31 filtuois.

240 Pitoli and poems united Records made Pive Star Masic Masters 646 Region Published Bestin

Schlie prema was led Free examina ton Send Poems M. Net Master of Music 1112-PS Walshire, Banta Montra. Calitureta

Short-cut courses for all instruments, hillbilly music Send 20c for hig entalog—receive 25c pick and \$1 chord finder, E4 Sam. Dept. 20A, Bradley Beach, N J

MELODIES furnished on 30 10 bars. Records, protection, National Songwriters' Guild, 15D Ocean Shore Drive, Ormond Seach, Plorida.

NEW Bongsriters Congress share \$15 ms in de are reach Any sub-act songs, parms revised resupced, pub shed, promited by largest from Inf. mature approvant free from N. dake Main. In bluffers over Some Sunant. How wood 2000. (all-fortion

ELECTRIC Gulture men iners whole have Free catalog Carrin. PSM Couns.

CoMFIFTE Music Service for Amateur Surge dets. Jerry Colonia, Bet 2004. it.rberk Calif.

VIOLINMAKERS supplies. Free Catalog.

SACRED trusts composed song priving Reg Laid Beacher Box 334, Morristown, New Jersey

TRADE R: Fi Results (2) () Send Record by Scrutches (up of Crocks P is One Donnt for Each Penerd to be Traded P in a List of Tru Preferences for Selatu Record We Relate One of Your Preferences of Near as Possible to It. Cincinnati Record Exchange, 261; Service Ave., Cincinnati I Ohio.

RADIO, TELEVISION,

BUILD 13 receivers transmitter signal tracef code once alor signal brief toy Complete hime rad a course only \$22.95. He need to spend hundreds of distant for a course fact a more fraction of its residue of the residual trace of taken parts to a frequency of the course meandes ever him said one of taken parts for a frequency of taken parts for the taken parts for the taken and also receive Free Serve lag Liberary on Hadio TV H Planting Liberary on Hadio TV H Planting Liberary on Hadio TV H Planting Signal Course Hime Deal 551A, 667 Union Avenue Birekt to 1 M Y

FREE Client Bargain Catalog Transistic Sin Hadios, Kita, Fortaxies A dio Rie trocks Philographic Option Tails Historical Write Leking 13:3 Everet Ave Cheuses Massa usetts

RECEIV Mrs tubes of commis jet from Spade 4 Knelvich Hurky M is Citally

to Hulet, 305 Hope, Lakewood, New Jersey

15 TESTED One-tube Circuits" with cataing 25c Laboratories, 336-T Fuller, Recursed City California.

CHYSTAL Radio hit 51 50 pressers.b.eg 51 25, phone \$1 75, catalogus. Cleared Crystal Company, 2006 North 4th, Milwauere 12 W scureto

CT Star Radio Vic Amance 2059 80th.

37 BUSINESS OPPORTUNITIES

OPERATE profitable mult order bustness Willia Walter Service. \$200 B East 122th Cleve and 5 Otho

MFTALIZE Baby Spore. Repair Dolls Repuid Batteries, Catalogue ''75 Idens Free Universal, Box 1976-B, Peoria, Illi-

TREE Polic '45 000 345 000; Unlimited Year are No merchandse, equipment, Unknown Work home-sparetime! Hay-

BitFall Rose Tropical Fish at home Earn S.g Money! Learn Serveta Relp Ful bure demand Amaz & Supot unity Free Patt Tropical Fish Breeders PY Los Angeles & Calif

FIX Topewriters Incopensive frame rouses teacher Fa fory Secrets Free Book let Write, Topewriter Tarentum 3, Fennan 1984

Which EMALE- Oct the big merchandise-furniture, appliances, TV s rathing that a nate acressed as most anothing Save half. Literature Pres. Associated Wholesalers Service, 1816-C Starr, Burlington, Iowe.

RRUSH Plating Outfits for pialing articles in the home and shop. No tanks mercenary fulvering Mirrors space or full time free particulars Gammetal Co Ave E Decause Ultinols.

e's WFFKLY -Home spare time Simplined mail bookkeeping. Immed ste inrome—easyl Auditak, \$4757D, Los Angress 34

it 000 FKW Prospects Daily Bain recerd mocks above albums, Sell stationers the our literature, Write: No-Co-Ra-Carate a Cautotina

CHECK Expensive Herbs for Us! Hig Pri 5t Home Sustance of Four own Year around profitunity We supply everything necessary! Bend for Free Amasting Pacts and Revening Plan National Herb Exchange But FY Chardens Unitornia

You'll enveloped addressed accutate to transmit Past service We have ramable addresses in your city themway & stem than 6548 Constant I Ohio

MAKE Exten Movier Cash conspitations Exerated buys east to set. Ad extrang to the Matches U to take Highwayers trace out the Scenaria II buyer Pourt-house setting to five Blend repet bustness. No experience necessary Superior Match, Company Dept. PX-256, 7523 & Oreenwood, Chicago 19

LFASIM Photo Negative (Portractive retrue bring. Mer. Wilmer. 15 linux punchise of a elicity for Photographers, by analyical Wirk for Photographers, by analyorder. Pull details sent Fire Dunes, 100 Forth Vermirk Law Angeles 6.

Trifft from name brand touries. No investment, no inventors Part time of full time. Sell famous brands of autiliances, housewares atversary radios as an anim cleaners. Latings tooks race has well for jewe to the perdent desire Send for Pres intangand and desire price list H. B. Davis Corp. Dept. 4 145 W. 15 St. New York C. ts.

\$150.00 WARE spare time profit possible flars at home with new flactivating Printing method \$5 starts you—send no money new Free Confidential Pacts and Valuable Samples. Screen-Print, FY, Los Angeles \$1 FLATE Seby Cham, precity girls brooze and colored pearl, Free Rock set Anderson, 11829 South Vermont, Los Angres 44

HOME Import Mail Order Business-Import profusite items below wholesale Enterierce and product investment un necessary Pull, spare time Famous world trader guides you. Free list 157 imports details. Mellinger, P692, Los Angeles 26

HOW to Start a Business bookset sent Free! If you Know any Trade go into business for yourself! Learn the 9 easy steps to follow We've guided 5 000 others to success Reves, ng Free Book of yours for the asking Write Mational Business Constituent, Other FT, Los Angeses 61 California.

MAIL Order—advertising agency executive reveals sensational no risk advertising and merrical disc methods. Start in utilize or home to imain a, itse positive profits. Presidentia Impact. 3607 Prospect Ave. Dept. 2.2 Constant of Ordo

PREE Cataing Contains hundreds of built esses farms and theome properties if tous bout U.S. Canada Sue for the ard location desired Deal direct with owners U.E. Buyers Digest , 608 H hurst. Dept. PS-1 Los Angeles 77 Canf

FREE Pulder How To Make #3 900 Year : Spatetime Backyard Rais if Earthworms Oakhaven 42 Cedar Hais Texas

GROW a living Miniature Porest or or chard (only inches high) that bears tasty that fruit at home. Learn amazing Dwarfing secrets! Sensational Fascinating hobbs: First More beginness Opportunity Proc Details! Miniature Nurseries Dept FY Cardena, California.

LET Me Sell Your Products Nations of I il Send You Pres Information On How To Establish Spacetime For Time Case craft Business You 2 thd We Sell Press that a copy led Abarat 207 WH Surget Lot A de et 12

BECYME Tax Consultant (study ates earn to \$2,000 every tax season preparing returns evenings. State approved. Union Institute, Hoboten 1H. New Jersey

1000 BRED Mink Broket plana 25c Lake Of carlo Ranch, Gravel Road Web-

to NEW Home Business Idean Book let sample Free Sp in Ft is Venet Birds on anrihing Flockershi-PY Los August 61

MINE Rassing informat in free Compiete Lake S persir Mink Form Superint E F5 Wiss main

VENDING Machines—No Selbre Operate A Route of Coin Machines And Each Amaring Prints in Page Casard Free Parkway Machine Corporation Dept. 18-745 Ensor Street, Ball more 2 Mary and

() HipW Or hids at hime Printable fas a climited his case? It me grower ext a m special light tempers are as a humid sy conditions orchids need Present de talla Orchids 186 & Vermont, Los An J ge es 4

BE as a sted state rotary public now to it at not Boorne Teams

\$100.00 WEEKLY Share room hase red worms solliess way Od riess Charle Mur gan Blek 1:60 Bush e., Fiorida

of 10 K pricts with no ca sa. Take orders for magazines your ness bors to mant blake sar on the spit We as a him with Free hit Oct tours now Wite Michigan Magazine Agency Dept 346 Michigan Morris 11

we Establish and a your own multi or der dis not bus ness. Sell appuances gifts broke housewares watches leve ty continue tableware disherware ou ery sto at duction to 15. No stock needed We ship orders under your name. Self-see list catalogs or sted with tour name advertish a post a da off-stars names of that order by ere supposed. Catalog, details free, Topyal Corp., Lindenhuist 431 of y

BUY at Wholesale Prices Resell at Big Profits Brand name merchanduse Appliances contwate housewates malches jewery rings dry saids couthing inggage book sporting goods form gifts etc. Pres 1858 countra and Write today Merit Home Products Dept. PS 2 107 Manhatlan Ave. Brooks of New York

MAIL Order Business" Magazine Most Comprehensive Mail trade journal in the world 3 Sample issues \$1.00. Refunded if Unsatisfactory. Box 501-CM, Lynn. Mass.

\$250 WERK reported Pres book 505 Odd Successful Businesses. Work home Expert something Odd' Pacific 36C Oceanaids. Carlfornia. PAMOUS Silicon Wateriam Battery Exclusive Distributorship now available most areas Factory areaed guaranteed troublefree for 10 years investment for merchandue on y Tremendous profit opportunity Free franchise Wateries Sattery Dopt 253 El Segundo Cautornia

SPARETIME cash at bothe flying saws by machine Precipion tests how Charles E Fotey Co Columbia Neights Munn

The R own \$10,000 a year business No investment Sey new Air Cushem Shore spare time Immediate commissions bother Samples supplied Charles Chester Boom 272 Brockley Mass

INTERNATIONAL mail order business Complete setup service not just instructions Herman 152 R West 42 New York

invisible Reseaving 15 in one hour possible remembring burns tears moth hars Spare-Pull time Proc Details Sail Weave Dept C-222 332 W Madison.

MAKE Perfusion Products Write for Pres Liferature Specialty Manufacturers Supply 239 Ideal Was Characte 2 H C

WHOLESALE cale of Appointments houses area etc. T is M Supply Bus 233 Erg Harbur N J

CLEANS windows without mess Strange dry clean of cloth Replaces ing da Windows gream Samples sent on trial Exister Ld Akron Co. 10

EVERYBODY Lines Candy Make Professions r Home (Our tills Year Ransdale Candies Didl East Orange New Jerses)

HALL Point Pen Reft to Pits Paler Male Others \$1.50 per 1.00 Triple Your M er Hurty Park Products Boll 11 Hig and Park New Jerses

\$400.00 PROPIT Making 100 entalogs. Coloring feature Reton paining You up to the print in \$1 lterns. Which from your Home or Office No need to carry plack We drup of p. Start Immediate. Send of y. \$1 count clerk Miles Under of stamps. for 10 calcours of 25c for Sample Pres. Instructions. Its luded. Contains O.P.O. No. 6.2 PS. New York 1

PRANCHINE Desirts Wanted Prince a Recommendat in Service Informat in Service and Service Report \$5.00 Box 1642 Br deport Comm

P. ANTERCHAPT mids limed subject planters fines candle subject Com it and marries from an hand Finaless fline Rue of Kanada

NATURAL M ding Rubber Evra To h Free Sam, e W Wooley 1816 B Donald Peoria, Inches

Absolt I TELY Proc Majorder Treasure C est Taster 1883 Peach Street Acres d -a Virg 14

Fig. 1. fermiore Make By Money Raising Pist to sma half Crickela Carter Farm Pinck Ca

OPPORT! NoTY to earn \$15,000 \$20,000 \$21 on a Fract the protected of ed do 0.2500 basis Love \$1 to one. He investing due to be 50 ferr, ed One of most exclusive and rear exclusive and rear exclusive and for free replanation busished the free replanation busished the free replanation busished to large and Company Box & D. La et et 1 sols

IMPORTING Modern drops p metrod Details free The Holen Cor ians 666 B 8th Averue North 51 Pete shung in Pia 8EL Books to mn 600 Profit Ruyas Box 668 M Covered 77 Obto

9250 WIFE creating veneral binds Parett ed Machine y Free stera are Robtt ster. 12 JA and anaption a 1 diana

Light ID Rubber Make Sexuble moids Free Sample Chanes 1961-C East Rd Jackson e II Fin

INTERESTED In Mail Order? Investigate Parts Before Plurge Free Information Prefers Box 2342 D Arbuquerque New Message

TO \$100.00 week a Sparetime hime operated man order business Successful Bear ers part Ever thing supplied Lynn, page C Na mai Lut Augeres 14

100 , PROPIT No Investment Stamp brings detain som, les Major Box 164. Brick en 1 New York

MAKE New Grease, on Doughnuts in Elithen Sell stores Free recapes & Ray 2005 South isth Minneapolis I Minnesota

MAKE firstbir moids Cust preques figurines. Pres sample Tooker 1848- 4 Fair view Hamilton, Ohio

EXCLUSIVE List of New Products and Same Ideas Obtain Pranchise 5, 60 McLaughten. I'll Baldwin, Jersey City 6. WEST AND DE LEUNCHT From Book Burtt, 3434ET With to LJ Kanass

WORLD 8 Greatest Instabl Bathroom Odor Banish Cust Penny Sells \$1 Write By Lo Products Birthe Calif

STOP Wrinkles \$2 Instruct Others, Detalls, Erbelds Oardiner, 230 East 257 St., Eucoid 22 Obto

57 WAYS To Make a Million Start from Scratch, Grow Big Others Have. You Might Too. Get Pree Details, Fast Woodaud 1221 Edgewood, Mavertown 2, Pe to

READ Matterder Laws and Regulations and Matterder Ruses for Beginners Learn about perseasy licenses. d "erent taxes legal requirements etc. Both books 17 00 Taxter 1603 Peach 6t set treased a Virgi s

WE Pur \$3 to the dried Grow Mushrooms Criss shed and outdoors Spars ful, time year round We have \$5,000 customers Pres Book Washington Mushroom and Dept 476, 2004 Admiral Way, Scattle Wash

POTTERY Made Without Molds! Self-Hardening, No Piring. Gorgeom Colora Land Ornamenta Note ica. Cemetery Products. Particulars Pres Marbieins Service Edwardsy at Hilbook

Products. Particulars Pres Marbietas Service Edwards is lidnots \$4.000 POR Mister Mrs. 33 5001 Pres Secret Journal Plan Magica, Work homel Publico-N33 Oceanside, Calif

PREE Prainting Profit Letter deorribes Nation side Opportunities Excusive Dute butorships, Designation, Asserts Operations Write Today Nations Pratition Reports, 232 North Michales Climate 3

RASH \$ 0 000 Yearly Raining Augura Rabbit Wws for Us Information 25c Co. American Augura Company Malia 5 Montage

IP You Have Tried Any Small Squinces Verture Ma Order Bervice Operator Small Manufacturing etc. Write for Internation Regardless of Previous Results Del Norm Company, Hartstown, Pa

MAKE 546 From Square Foot Firwood Jacob Stevens v Proc Details Woodarts, B. darva or Mass

YOUR Own Name Burness Sur restal. Pint 25c House of Lords, 36 Titromb, Newbur, out Mass

WANTED I mited number intelligent Men and Wiener to work at home of excessive Man. Other Business proposition No selling we turnus everything including the later names addresses attack and ship items for you. Pres Details, Mail Order Distributors, Py. (Franchise Division) Los Angeles 61

OPERATE profitable mailorder business Free details, Thomas Bond, 1837-R West Vernon, Phoenix, Arisona

CASH From Sawdust, Tin-Cans News papers. Over 200 Methods. Instructions \$1.00 Charles Company, 12-XBD, Norwood. Ohio.

Plano Tuning learned quickly at home Tren et door fie d. Munical he wiedge un necessary. Information free Freque S. Champaign Banots. Pounded 1935.)

EARN \$10,000 Year 1 OG y two anset du 1 World a Best Se ley T e H 1 Rible I outrated Pl testas I or Califoric Margareta a P O Box 83 Harseton 6 Pa

OPPORTS NITY Own Probable Recent Business Part Pull Time of Ma Pran of se Details from Henford, P.O. Box 525. Fait Land N.J.

SELL No Motor America Concentrated Motor Represented Exclusive Repeat Business Paimer Sales, Lowellville, Orio

"PLOCEON" New Profitable Way to Beautify Anything. Automobiles, Signa, Novelties. Make \$13 66 Hourly Send for Material. Complete Instructions. Introductors Offer \$3 00 United Firston Compar \$30 Tauton Avenue, Seekonk, Master husetth.

sicce MONTHLY Possible. Sparetime, Home Mallorder Business. Write Stevens Company, Box 188, Ft. Gibson, Oklahoma.

CANDIED Popcorn and Potato Chip Equipment Eakins, Box \$22-B4, Springfield Ot to

LEARN Mailorder Selling Pays Big' Pres Colliers' Reprint! Elbott, 216-E W. Jackson, Chicago 6.

MAKE strange partic building material of waste can'y Water fire wear and term to resistant Baja Laboratory Ohia-homa City #

"HOME Business Dipest" Since 1996 Includes 'Newest Products Report. 52 00 Year \$3.00 Two Years, 35c Sample Cart M. Brown, \$16 M. Cayuga St., Ithaca, New York.

BRANCI Her Wholesale Books Di ecter: 300; Prent Importer's Chade -Worldesde Importing Drop Scip Pres Detain Goldsand 1,013 Duty Hawthorns Ca forms

R BACKEAM Concentrated lates cream Makes molds quicker! Thicker! Instructive literature free! Casteraft Studies. 200 PS Marion St., Brocklyn 13 W Y

START Profitable Home Mimeographine Service Our Exciting Secret Plans Expose How! Write: Mozelle, 505 Cherry, Bonham. Texas.

\$100.00 EVERY Day! Amazing Battery Re sension Sample \$1.00 Laboratories Carles on 28 K South Caloft 4

BUY Wingrad 6'2 000 Hems Cottage Industries Box 61-PSA, Des Plaines 'll

BPECIALIFFE Magazines From List. Core 5 Do Poblic ations to desert Cores Over 1 CO Be 1 Few Box 25 A. Trades Branches A and de H boxes North Commission Box 448 Franches Commission Box 448 Franches 1 4 A A

BUY Wholess e Over 18 300 Mationally Advertised Products App is seek out that Sporting Goods Mossewares, Watches Typewriters Tools that are sid bend Protected I day Buy-Rate Box 236 House Charte 5 New Jersey

MAILMAN Brings 5 50 Da h Teated Authentic Amezing Mas Order Deports by Octa a Price H idea Pub attone 210) Ore with November 10

Critical LAZED Los to a put all made without monds. For each margod tribe term products have send the Busem of leak sen or Money with his projects likely let despite free Man to J. Physical Polyteries crand Reputs, "Minnesots."

Make Money Writing Short Paragraphs Information Pres Barrett Dept CX 20 7404 M Clark Chicago 36

IF you have a product or service that can be operated on a mail order hasts write me today I will send you a Free Ett an 'How To Make Money Out Of Classified Advertising" Mext lause will be April Closing date February 2: Hurry-Do it Today! O E. Kerly Classified Adv. Mar Dept. 38, 351 Fourth Avenue, New York 10. N T

WANT To Make Big Messes At Home! Bid 10 profit in an hose possible esti in special by a later discussion and the suppose for an end of later in Street in discussion in the later in the la

MONEY NAKING

SELL Traces General for more by and that districts Cutaing for Dismortable 2430 8 1 1 Oak and 3 California

HOMERWOOD ON Write Jor en tile deta i orienti i gladdress of and bles tot. There is C. M. total. Indiana.

139 The TIVES Wish home from Expense of the catalog Detection hard of the free. Write, Wasponer, P-125 West 84th New York 34

htelf Woman; Start Moses Making Posts Lame sting it siness at home in apprehiment time Materia. All costs a british has a fight or care by the part by a day Write for E. Mat, a and Pres Most I name or post card to Warner, Room LL-3-A 1513 Jarvis Cr cago 24 12 note.

MONKY Plans Secret Journal Grandpa, two daughters made \$2,500 first month Work Home Publico-N22, Oceanaide, Calif.

PAYE to be on Name Brends of Jensey Waters Appaintness. Purniture Mannes of Theories Witnesses From that Furnish You Free Wholesale Catalogs Rush \$1.00 to Abbott Wholesale Distributor 281 Amost Road Bullato 28 New York.

HOTTEST Mall Order Plan Ever! Sell photos, films, art novelties. Huge proven profile Pres Detain Profits District Dept 2P, 15015 Vantura Blvd., Sherman Osta Calif.

VEND.NO Markines—N Se king Oper site A Ruste of Cots Ma o tes A of Earn Amazing Profits. 33-Page Catalog Free Parkway Machine Corporation. Dept. 19 115 Ensor Street, Baltimore 2 Mary and

MAKE \$5 000 yearly sparetime familing frink funch as marrie etc Free besk let revens proved plans. Write Furn 500 Mt. Flesson's Road, Tutonio 2 Cusada. 137 BUSINESS Plant Collection For home or outside sparetime possible Little or no capita, ing profits potential practical diversified Mandry and Total, 216 West Jackson Boulevard Chirago 6

START Big Pay business at home a space time No expense at newfeet to antiair hitse table to be nearline for box. In
haby shows Mane \$5 of print to rest
pair F , patt stars free Send pre-and
to Manca 1512 Jarris Room CM a A
Chicago 26, Illinois

EARD cash at once sending as easy orders for magazines tour friends neighbors want buttant profits. We show it will but free kit even it ing rou need unto Mitten or Magazine Agency Dept. 500 M. of Morra Life.

.00 WAYS to "tart Your Own Bustness." Free Pamphiet 100 Bustnesses Box 60 S. Omaha

FRUE Book "505 Odd Surceasful Businesses." Work Home! Purific-15c, Oceannide, Calif.

PRINTING off a pipites wholesale flave to . No at Box 168 to Cleveland 27, farms

\$1 TO \$30 Checks daily Write simple series on paragra the postry for year No exercise necessary I test you What to Write How to Write Hope has been as the first for Pay Tuday Wite Herman, 1726 W 25th St.

Clear and 12 Ohio

SPARET ME Repeat Profits Taking Magazane Salmers, and Special Critical Care I Agency Bearing Bearing 2 For da

Week's Hobby Business Assured Choose Yest Hobby, It Pays. Details Proc. Success, RDR=2, Box 133A, Nixon, N. J.

JOIN the Prosperity Parade with a Mail Order Bookshup in Your Own Home Valuable it mail in Pres. Practical Publications by 6 6 Milwaukes. Chicago 41 Eli

\$60.00 WEEKLY, sparstime casy home Yangtian Blind Laundry From Book Burti 2434KU Wighita D. Kanana

None of Jewests Nove see vic at Nome for an Free Jo Ca Ries o nater 840 A Northwest Sixth Court, Mismi 50 Florida

too' 1 ARS Every Day! Amazing Megic Ma Arder Plan Setup Free Miller, Box 200 A Cabl 45 Wisconsin

MAKE \$250.00 Monthly Space Time With Jigsew Pres Details. Elizana, 346 N Summit Stoux Paris. S Dak

PREE Timestore - Make Big Money Real of Pas warms and Crickets Carter Falm II Flams Go.

MAN and we men warried to start home has need in cross of all the table top a liber states in an expensive for the state top a liber states in a confiner of the state of the

RETIRE Early, I Did Have Everything I Want, Home, Bank Account, Real estate, Yacht, Vecations, You Can Enow How" 63, Only Investment No Orowin Hoen' Feedin' or Muslorder Capt Win Laws P.O. Bet 1000 Tampa I fix

ness \$540.00 Monthly spare time! Entire to ande open Free Facts Dixteland Pub sters Asheboro 8-B, North Carolina.

INTERESTINO Mail Pres Lordy Midgel Bible 50c John Morris, 3356 Lettion Riverande 20 Cabi

MAKE Money Addressing Literature explaining, free, Cove. Box 2586-L Greensbore, N. C.

WR Pay \$3.50 h dried Grow Munroutia Cestar theil and cutdoms has a full, time year r and We have 21.000 matemers from Book Was again Mush from and Dept 1.0 2004 Admiral Way, Seatter Wash

#15.000. PROPIT in One Year Possible on \$5.00 cash and just 5 hours attention weekly Experience unnecessary Pabulous but true! Proof complete detailed Plan only \$1.00—antisfaction of refund! Columbia Enterprises. \$203-5 Grabb Road, Silver Spring. Maryland.

"HOME Business Digest" has Moneymaking Opportunity Galore. Sample 25c. Denovan '19 PS Greenbell Levillean BIG Money Rarned White Asleso! Heighbors Think I Street Oil The se He tad My Rig Secret 6 Years Not Art other Scheme But Leg I male Scheme Pripastion Easily Handled by A one Noting I be It No he' in Details 9 00 (Serundahiri Grand Grandham Penna

AMAZING Successes Through Franchises Holder chases' Second Exclusive Franchise Holder Your Territory Information Rushed National Franchise Reports, 331 North Military Chasgo 1

PREE Folio \$6.000-845.000 ffr on fed Vaca onto No me changing C kings W & bount sparetime! Haylings \$16 Ca shad cast

START Home Mail Order Business. I Made Enough Money to Retire Now Own \$48,000 Home. Drive Cadidac Have Money o Ha & Amazing Pacts Pres. N. Cole. 211 48th Street West. Bradenton, Fin.

\$2.500 IN 3 Weeks. Guaranteed Investment Plan. Stark. 14231 Wentworth Chicago To

MAKE Money Mailing Sample Business (ands beares Printing 6464PH ('to han Diego 17 Culif

1deas." Gilbert Risden, 2735 Orand River Detrett 1, 347 b

BRONZED Baby Share Map th go Prompt Delivery! Porster 1536 Ardmore. Chicago 25

TYPIATS Make Money At Home! Matters 7 Martin on Greencasts Indones

\$30-900 WEEKLY addressing envelopes Instructions \$1, refundable. Reiss, 2.6 Pitth Ava., Suite 1102-W New York 10

MAKE Money Citoping Newspaper Items For Punisners' Detailed plan Newscraft PS-983-E. Main, Columbus J. Ohio

BUY Wholesaid 20-36% Discountal Appliances, Gifts, Typewriters Twa Watches Sporting Goods, Jewelly Cameras, Rousewares, etc. Consolidated Distributors, Cilifon 11 New Jersey

PREE Public Work at home Spaintime Set & Status Jackette, Box 37213-27 Los Atgetes 21 Confedera

WART Dusty Cash in Your Ma hou? Picasant H nework Provides Great Aupreciated her see to Customers a 4 No. Profits to You? Deta a Free Maford House Saless 1, West Virginia

IF you have a product or service that can be operated on a mail pider basis write me toda. I will send you a Fire Kill on 15 m T. Make Money that Crit can field advertish g. West send h. he A. in Consider date February 21. H. rr. 12. It Tide. O. K. Ke. Committed Adv. Mgr. Dept. 24. 151 Product. Average New York, p. R. Y.

BLA BUT IT WHOLESALE

Laborar We seale Supply Source In CA test 23 fee catalogs Publishing, chitics applied to all a mile a resisries form of inject. Les 2 diseases higher miles Free details Associated Whouseases How 52 C Bur ngive Time

BiG Multicolor Wholesale Catalog's Housewares, appliances, clothing filter-ware redware luggage, biocculata, radius provide applied america for deta provide a luggage, biocculata, radius provide a luggage, pro

Direct to result to the first state of the Parity of Televis of Parity of Televis of Parity of Televis of Parity of Parity of Televis of Televis

ELECTRIC Outtars, amplifiers, wholesale Free catalog. Carvin, PSW, Covins. FREE Wholesale entalog Gifts, appliances, books, housewares wateren jewelev cockware tableware dispersoare outiers etc Discourts to Mr. Topial Corp Landenmarst 222 N Y

Hilly Whiteship Thranships of Nathonia Advertised Priduce Apertung conducta Radio Polymenta Heroda Ration Cameras Principles True aperture Robert Rational Language Powers Published Rational Caroling, Products, Languageship and Products, Languageship at North Caroling,

WROTTSATE' Ap ances Two a Climbria Jewicz Ever thing! Pres Catalogs! [L. ted. Wousesairrs, 1365-P Broadway New York 1, N. Y.

THE STATE AUTOMOBILES 1 40% Off Characters I and Jakiese. New SHO Western.

BIRCH Kitchen Cabinets. Free Catalogue Charlotte Wood Products, Charlotte. Michigan

DISCOUNTS To \$2% | Appliances Watches, Housewares, Cuffa, Turner, 2105 Central Alameda Cultiornia

BUY Wholesale Nationally Advertised General Mer handise, Appliances, Sportlind Courts fone a Wa hea Tours National Courts fone a Wa hea Tours National Courts of Referedable 2 of Order Ke At me duals as the Morse Avenue Dept B 12 Mag 1 Mag

BUY We resaile Over 18 000 Mattern by Adve though I don't App meet pairs as End to topics Mountmases Watern Tyres less Think (1 thing of Jorig Posts of Tiday Buy light from 350 Marks United New Years

39 FORMITAN PLANS ETC

PORMULAS—All kinds Latest p sports Literature from Reming, Fark Ridge 15 cl.

LATE Modern Manufacturing Pormulas List Free. Chemical Service, Martville, New York

MODERN Putmissa for the heat in fact by a dig profit products. Fre-out in instature free Miller Chemiss, 18,7 d. 1 on pa. Fo. da

40 PLASTICS

LEARN Plantics Paletontion Por spare time to one Low cost home that and the manualise Write I'r free backed I ber state from ing Bervice, Dopt 13-3, Portton 12 Ores of

NEW Liquid Casting Plastic, clear, colare Fried real flowers, coins, photos New Manual shows fine things the can reale at home and sell at his profit for a 2% Castolile, Dept. B. 41 Woodstak

LAMINATING Supplies, Price List Pres.

PREE Beautyrus Practic Moreto and Cata of Can of Plant a Clear Course Marble Jenson will Buyu in Write India Canadrall Euro Dept B-200 P.O. Box 55 Paio Ato Cani

Pt F X 1), AR Require find rest , F 4, 20 , 6 52 1 ,6 6 86 , 8, 21 8, 21 8, 23 1 84 15 C are said 0 Bend ,am for postage Aristocrat Finetica 13 Busiex Avenue. Newark, N J

PLANTIC Custing and Mold Summer Catang are des from that it M d Can street. Liquid Grass Steel, Rubber Send 25c Gel, Box 261, Union, M. J.

PLEXICLAS — Any thickness Clear to the Coar Rode 7 5 ing McClarin Plastics, P.O. Box 1468 Henover Pennsylvania.

"CHEMIGLAR" Liquid Polyester 18 Os. Casting Outfit, \$2 10. Technicraft, 1154 Commonwea th, Boston 34, Mass

41 CHEMISTRY & PHYSICS

PREE Chemical and chemistry literature Directory National, 1168 Fifth, Redwood City, Calif.

ILLUSTRATED Catalog, Chemistry mineralogy isology 25c, Tracey Laboratories,

CHEMICALS, highest quality in small quart in Laborat zy ag, a stun literage rate 20th year John H. Will, Co. Jic 124P West 23 Mt. New York \$1 F. Y. Cathing 256

CHEMICALS and apparatus for industra. By a part of the laborates of Catalog 25c Dept. M-26 Biological Supply Co. 1176 Mt Hope Ave. Rochester 20, N Y

AMAZINO New Book Of the ence Expert merts Fermans and interesse of Lanceautry Supplies Only 25c National Scientiff Co. Dept. PS 2 50s West Road, Lombard, Harrows

CHEMISTRY Science magazines Literature free Lamaton Son \$126-D13, Lamaton 4 Min h

CHEMICALS Ginarage Catalog 25c Laboratory Saint Box 161 B Brighton Many

EXPERIMENTERS Bargains Catalog 253 (Relundable). Hagenow Laboratories. 2414 Clarks. Manitowoo, Wisconsin.

43 HELP WANTED REPORTS

COPYN CHIERD Reports on heat parting 5 by with travel adventure promotives Controlled areas as stroping absorred certain trades supervisor factors utilitial opperation factors utilitial opperation. For men and names of with a document of the first operation of names and names. On a some operation of the trades absolutes from the supersection, South American opportunities of his about the first operation. South American opportunities of historical of the first operation. State 3.4-PSh Maramac Building, St. Louis S. Missouri.

AMERICAN Overseas Jobs, Such Par-Mer. Woren Transportation Pard Free of Semantic Transportal Dept. 8, 200 West No. 81, New York 1

YOUR Abilities needed in booming Callfornia industry? Act today! Send \$1.00 for a set emps ment tasts dervices But \$6; Oak and Uniformia

First sterions. Cutoffulfior other big time jobs. Pa. up to \$1,000 m in his plan become rated and market being e.a. Cutonds. Alaska Coel in in these Figure ada e where he so app. Send \$2 chife in derivate for far deta a Price on full in Fritzs services on in Empl them Research Lang West Reside, With the to 2 Enters.

PrintErroll , An Latin America Alaska Canada up 5 5 500 m att a 1 p to da e 4550 Poreign Bervice Directory gives complete information, hot last of firms hiring for Military and Civilian Construction, Aircraft Oil Expotters-Importers, Mindian How When When there I as I with his many year 11 70 fix to Persona But 12 Lan Angress & Cardinina

HIGH Paying Jobs. Opportunities, foreign, USA All trades Companies pay face For information write Dept ELL National hand me to formation 1830 Broad Benand New Jobs.

PORTS OF SEAS PROPERTY OF STREET PARTY TO THE TOTAL SEA HEW YORK

POREIGN. Assaur, USA Jobsel To \$1 500 00 Monthly! Million Americans Employed Overseas. Copyrighted Reports Who to Contact for Highest Paris 1 be laborers—Trades—Drivers—Office Parisoners—Trades—Drivers—Office Parisoners — Trades—Drivers—Office Parisoners — Trades—Drivers—Office Parisoners — All Contact American Science And Institute Parisoners — All Contact American Portion Uniconditional Mines has been foundated at the attention Remoter St. Louis 1 50 Minesouri

PLOTEDA in pay big. Special copyrighted as a rais at maked \$2.00 Free for the a 5 mars Service Petro 6 Florida

Ct Millio to Cal Trus? 3 Page Bonk let John Heighton Chies Surfater From Street, San Diego 4. California

JOBS Onlore Big Pay Individual Protessional Bartenders Instruction Management, 557 Pairway Tex, Phills, 28, Pa

42 AGENTS WANTED

MFR Nomes Agents Second via new months makers. Beautifule that dies ted plant is performed to a self-argement a serpectal rules beautiful on the second to the second to the second that is a second to the makers and a self-area country free Misseys 3363 Month Aretica Chillian 4.

That R can brances P its \$1.50 ther creat \$5. Ma greater by 55 et 12 c Ladies' Coats 30c Dresses 15c Promous profits Catalog Pres Nathan Portney Associates. 405-J West 12th Place Chicago 7

AGENTS—100% profit seiling genuine vid window letters, stores and offices Free samples Metallic Sign Letter Co., 11. E West Newport Chicago.

FUFRY man a prospect Request free same an showing line of belt buckles, ind a during with customer's name and emblers also up budges for trucking bus in the freeze C and Solve them. H at Past Box 1425PS. Providence, Rhode is a d

FREE Sample Resultful Peather Pafurm System Apertage 2016 Mexicu , D P GOLD or Silver letters, numbers, Windens Thank I'r he I to 6" Jones Prof. In Pres Sales on Atlan U 364 West To C? on 20

MONTY Making Connected to Take big price liders for wind factions Painted valeties From Trees. Also Pointed to Super Vices his Names of All the Stark Box Deak 20,28 Limitians, Mississon.

BUY 200,000 articles direct from manufacturers the world over at lowest prices. Make up to 1000 p art. Five Literature (c ass. F. manufitty | Pa.

COLDMINE of 600 money-makers. Proc Copy Specialty Salesman Magazine, Desk Ch 367 North Michigan, Chi ago 1 III

ANYONE Care Be I fair as II and I I I form to list be act, shi per may exist a single district at the state of a sea district at the father than the father th

AMAZ Not tressing Card Money Maker -- Make \$25 00 on 100 Deluxe \$1.25 Assortments Nament 21 for \$1.00 Tall Cards Off Novelties 123 fast sellers. Clift Bottom baret profess amples Free of hers on arthur a \$1.25 Off for prompt at in tressic Cards, 6601 Cerman, Dept \$1.5 H. Chi. ag > 21

KARN M.g. Morey Pull or Part Time On this M. a. almin a leating contacts when the burk go bush go he not bush refundable 6 the residence strature so and hit from home a nature James B. Surrart Co. Dept. Ph. al. Musicases M. de 61 Mass

(ANH commiss us at once taking or ders for magazines every family was to the experience needed. For Pres money making hit with everything you need write McGregor Magazine Agency, Dept. 136 Mount Morris, Ill.

ORT New Shirt Outsit Free make \$90.00 were) is 3 average ande a day Fam us que to Mode f. Measure dress and special seat \$1.00 me fast to a f men. No experience needed Full or part time Write Packard Shirt Co. Dept. 643, Terre Maute 3rd and

AMAZ his new liquid discovery menda rena a fati a of ad kinds as 60 seconds. As rolled a dem catrative best time to a Fire hart, a life Write No New Dept PM 2 Job South Wells C Lago 6 I more

"Ming rera a thout "Polish New in vention Lightning seller Care gream are mirror Samples sent on trial Eriator & Akron Ohio

FIANT Your Own Business with R 14 Kn 's sharpster he a small to stores haves for a part this High profits on to the same he see to the his left respect to the first seed Test Lories profits left F or Profit F or Outline A first Speare a Sone Co. Dept. 26 116 has a high seet Camputable Mass.

all a same interested in tracking districts in medical mass time of edge of excepts of equality to black action to the end of the property of blackwards from the law of the law of the edge of the ed

It is one to be over by time hastness printed to a sendare and rising open a time and printed as a series of the and printed as even first day by a communication of the Freezence United and Printed Big sales hit free National Press Dept. 7, North Chicago

Bits prints first Low cost premier Engin. Chart in every market. Chambers Butter Falls W.T.

Will you wear new suits and topcosts without one penny cost and agree to show them to friends? You can make up to just a rank in f C Field & Sun Ite Dept 2 KM Harrison & Thresh & Sun Chicago I

in has additioned H on and Commercial to their Manne \$25 daying 25 is others. In thee has pleased details, write Studies out of their confidence o

AMAYANCE descript Marter class puts bet a tiglate his suffice on cars Pres Name, se formation buy name inspects Maxim Class Tiest 306 7720 Marmand, Marmandow, Wiscopass CALENDARS, Advertising Movetten, Matches All styles, including Re state Varnished 12 sheet, Girls, Hard eds of Advertising Novelius, Book Maures etc. Pleming Casendar Co., Promotional Divi-sion, \$530 Cottage Grove, Chicago 27 III

I'ld, send you free stocking sample new out advancement in hostery since dis courts of hilon. Patented to or gift state up without supple ters amazons v confortable. Nations, v satterfised police 5, 36. Make motors fast introducing to film do at 5.00 pair. American Mais. Dept. 642. Indiana-pe to Irdiana.

SEFEING new products? that my out fit 4 money making special es Latest ronveniences for hiera car Arid no mile es Just your name Eristee 17 Akron.

STEADY Big Profits in Nationally Advertised I preshably Partic Housenates Tables overs Drapes & 1 by Covers Free Cata of Page Acciding Box 4, New York 40 New York

BUNINESS of your ben Earning prier tin, as high ma \$40 000 or of a lan-cri \$12 500 base. We muy hard so to be Bond I'm free explanators had at Marrell & tomount Box # DD Louist # la

WHO! FRAIR Cluthing Catalog Plus Real Mer ha dise Samples Bustoman Is D Dog Square Buston & Mass

ATTOMORISE Specially Salesmen Patented Davis Ban Bir Protests Drive Line Parts and Transmission Serie He Appenie 15 pair Ha & Saves Labrica ! Ever Cher Parts Design of the standard of Parts Design in Log at Protopert Attractive Ex us on Telescope Note to the Wilder for Do'n in Dates Hall Band Company The., 2005 Tale Street, Houston

WORLD'S Timest Radio Real Deal Dealers Wanted, Radio, P. O. Box 39720 Los Augeors S. Charleton

EASY handwork makes fast as ling arts cles dam, is free 5 it made Company B sich in 66 Massachuser 5

\$1.00 PROFIT seding \$2.26 photo on largement offer Acen Houle, Region Hidg. Little Rock, Arkansas

MINIST-GRADE BALESMEN

MAKE Extra Morey Coals common the Ever body burn can't have Advent and the or Advent and the or Maketon Property that on Property was not business. No reportation of the state of the parties of the Company, Dept P 258 1536 C. Orectwood, Chicago 19

\$1 000.05 A month for making dramatic 3-second demonstration of amazing lightcreight Presto Pire Mall g ater chem; all deed by airforce to .To dul fires inneg! On 7 36 95 Ter 3c common stone M man with it Free Mil Mr. to 114 E. Sind, Dept. P-86F New York 16

AD Matches! Sels smeating designs to 10, 40, and 240-light Book matches been sport to the light with the light states are to be the light to th these a present here prove the high qua-tic Research Start with an majore of first, momen foll part on the fact of Bases hit formance. Match Curp. Longe Ph 91 Chicago to 1 design

BUSINERS his free! Postcard puts you in business! Complete line 236 since styles areo in acts! New discoveries pay his communications. No investment Send for 7 or his Mason Chippens halls 73 Williamson.

2 CENT pentiard puls you in \$ 9 000 on 3 suies a das Offer uns to siness of 3 sales a day Offer on serial wanted profes t not be d to store we train Man, and for more man at plan Box 2651, Dept. 1313 Charlotte N.C.

ARCHDAVITA Metos Better Living Reger Bank Bate-ree' Can po Ocnob Long Bench 14 Caller a .

WANTED Part T me Pire Extinguisher Galesman Out O Matic 1727P E. 31st. Denver S. Colorado.

BIG Moneymaking Opportunity. Exc as give line uniforms, jackets panis, shirts, reveralls, sportwear Advertising embroidered Every but ness prospect the Sering Outfit Free! Meater Co., Dept. F-22. Lague ser "ad ana.

EDUCATIONAL &

COMPLETE Tour High School at home in space time with his year old arbon. Texts furnished No classes lithings in formation booked free American School Dept X246, Drexel at 56th, Chicago 32 Can Paris

EARN Degree, Free bulletin, Homestudy Midwestern Bible School, 1968 Broadrippie, Indianapolis

home \$2.00 ppd. Take notes three times faster Fineline Company 30 F Fifth Armont New York 16, H Y Fret Bleru-

PRED Correspondence Courses and Books sold and revised Money has breast ander Calaug free (Courses Bought) Lee Minin ain Plegah A abema

BE a Real Estate Branch Study at Humb Write for Prew bank Luday (il na-prived Wenner Schund of Heal Solate Bulk Orn d Karmas City Ma

EARR While You Learn Auto and Diesel Merbant a Master Bus top paying trade Many graduates part \$100 a week and up Apprived for Kitean reterate. For free of in A. to Diesel Courge Hasht is 3 Trus-

STUDY For Doctor's degree of Point of our Metaph is and D 1 to C ere sponder e courses on Course of Driese Metap is a Dept P R 2011 North that next Ind angle to 8 and COLL

10% H Method & prome at home. Liversed tea hers. A grissed mate, a.s. S. Ciero States Acader. Box \$366 P.E. Station E. As ab a Constitut

WANT a Dance July New Opportunities to be reason incident. Magnet Pay M re. Middley We can be be you Qual. The s 2 op method home training Write to day these Traine Heary Equipment Disasset It states Training Service Write lo Der 1 B 2 Portin 4 11 Otes di

ENGINEERING Degrees equied through Home Study Pacific Is ternathened U our sity, toperating so a Colege of Eng. sering only at present \$719-A Santa Monica Boulevard, Rollywood 36, California

LEANN While Assets Data is Free Re-med L Assets Sin 6 o K Consider BOAKERFORNS | Livered on Fig. 1

inca Operate your own amounted Ded in A-Week Bookkeer is and Tan Sera by Pull or sport time Defend Pres No obligation. Ellis Sex 302, Cedar Grave, Mirth Carolina

SIMPLIFIED analytics would eigebra clear v 32 g aras tood T-6123 Orchard. Dea bern Min 1861

WYS DYES carn be money East learn Ar. time Automatic Welding New equipment him right trading to the right in a full Approved Fire thousand Houset West of help. Box P Mt Tree til se

PINISH High School at home a sure time. No classes. Diploma awarded Wr to for Pres entalog Wayne School. Catalog MBA TS. 2527 Sheffield. Chicago 14.

MATREMATICS Universal Correspond ence School of Mathematics. Box \$223 Philadelphia 36. Pa

SCORE high on college entrance examinations. Prepare quelly us h designe C ar well p a the fest only \$2.00 ppd. Cramwell P52 Adams Muse

Plants Tuntry pa a Hymoser & spare tions Learn at his one or 30 de s. No de 25 de 25 he de legge interesa. Plus oprains not a des terms not en la marcha de la legge de la le Purt Lauderdam Fintida.

WATCHMAKING-Jewell's Home Study Courses. Greatest Deal! Watchesling Institute, Culver City California

MRN warted use 10 to 45 to train as Bu dere fit meties & Curtimiters at home in space time. But pur spinet curtion W to fee Free breet to Americal Tests 342 Charago 27 Trimeta

LEARN 3-d. Fender repair including carbure of a tion foreign at home apare mela n rk of as parting meta with Wille for he in the for he in the first man in the first back. Dept. MM 31 25.3 Stieffeid Chi ngo 14

IT it has much as a language by Lingua phone. World's Standa & Cityresis in all lighthough A. hume. quicker easy y learn to speak Fremch Specials German Japanese Research Modern Greek your choice of 34 is gauged it vialte being in strother courtry Complete re-arded can see on Free trus for id for Pree book and Deta is No Obligation Try don't buy! Linguaphone Institute, T-54-600 Radio City New York

IMPROVE your singing! Valuable explanatory thesis \$1.00 portpaid Address Cramer, P.O. Bex 2502, Glendale 1, Cali-

BIBLE study courses by mall, certifi-cates. Box 235P Bren, Calif

VOCATIONAL Analysis Questiornaire Write 19739 Prancis Place. Let Angrees M Callf

ENORTHAND in four days Learn of LEARN! Dunce! Right away! Free "An-core \$2.00 ppd. Take notes three times town?'s Instructor" proves you can't later Pineline Company 30 P Fifth Castle's Homostudy 507 Fifth Avenue, New York City 17

JOIN Science Parade Learn Electrical Drafting Eas v Understood Stigh Pan-Low Cost Course Thomas, Nov 186 Concord | New Hampahare

LEARN Real Estate Bludy at home. Send for free catalogue, Midwest School of Real Estate, 66 Morth Chicago Street.

HYPNOMIS Unameres Influence oth by Ph D 45 60 Settefaction E carecated Wade Hampton 1330 Micheltoreus, Las August 24 Cautornas

EARS Diplomas, Certificates, Degrees Specify Interests Speciality Jan & months, by I misotal

A Dynamic Singing and Speaking Voice can be journ Self Training records The ling details Carbeid 2018-C Pith Assesse South Minneapons & Minnesota

third of Problem 10 500 Medical Pro-chieffe, Scientific Resources \$1.00 Clinic, 1330 Hunting Park Ph is Pa

OTT (red)t for What You Know Eduentional Tests of Administrated in York Local to Businesting Business Deposal St. des. Pres Deans Common Resear h frieditute aver Adams 3 Massachusette

100 000 AUTOMOBILE Mechanics Needod Steads how ment tried Pay Banks

WE Pa \$3.50 is dried firms Much receive Coving shed and outdoors By are fur time year I rand We have 2 non-customers Free Book Washington Mush-room Ind. Dept. 130, 2004 Admiral Way, Seattle. Wash

EARN College Degrees, Correspondence Metropolitan University, Box 86, Diendale, Cultternia

LEARN Plans Tuning Easity At Home Our Graduates lead field, Our soth year Free Booklet Niles Braunt School Dept B 3711 Stockton Bivd., Secrements 29, Curl-Correta

CUMPUNITABLE LINING for Elfe Quer ate west one fragmented Bangon Has-tions Acal in Bookkers of Tax Ber un Puller bare Time De als Pres Vacider dr it Job Pranskin, Kaal Orange, New

FRYSICAL Therapy and Massage Home Training. Practice privately of work with dectors and hospitals. Free Catalogue National Institute. Box 4, 160 E. Ontarie. Chicago, Illinois

RARE Degree From College Abroad Tab of Test Mo T are of Phone was Fields, Aures, Central Valley, New York

SALESMEN! Quaranteed increase in closures, \$1.00 Educational Sales Presentation P.D. Box , \$40-P. San Francisco.

I SFIR C dres en derner Cincroen Rein g. tional Books Bournt, Bold, Catalog Free Vernon, Trion, Os.

FREE "Tour Amaring Subronactous Bix steps to Success Bus \$47 A 21 Orean Park Cald

MELP yourself to abundant living Our courses have aided students to richer to ser lives Leuro servet of ou tepin enthappt and East des res PaD his D W to free beed. College of C. tvetsas Trith (Currences detice School) 33 K & Jack-BUG (

CONTENTS

Wild contest money. General Contest Buskel e. g. rent contests, rules, Sample magazine 21c. General Contests, 1000-A East 8th, Du-Stath M. newata.

CONTRACTS He is Over 10 Peace Win with My Help. United 25 Earl, Red Bank,

PRIZE Contests! Publique Home Inrome Charetur, a How as d Where to Win Your Sharet Latest Contest Books! Bend Stamp' National Contest Bulletin, Box 2625-PS, Mismi 16, Plorida

DETECTIVES

LEARN Civil and criminal investigation at home Rarn stend; good pay Institute Applied Science, 1930 Sunnyside, Dept. 133, Chicago 46, Ill.

DFTECTIVES- Work home- Travel Ec persence unnecessary Defective Particulars tree Write Wagnest, P 125 West 36th New York 36 DETECTIVE Training Phillips Secret Service System, 1917-C North Kenneth, Chicago 20, Ill.

BE A Detective, Write for free details State Age Nature of Dept A. P. O. Box 1982, Scottsdale.

MUSENESS SERVICE. INFORMATION, NAME LISTS

WOMEN Mail Buyers Names \$5,00 Thousand Durite, 2534 North N.J., Indianapolis 5, Ind

OPPOINT V. IV Beegers Women Ma R: e a Names \$6.00 FF r halld Vaporana Name West 4 7 Con. 5 L State &

PLOY COA HUMOUNDERS OF EACH

AT AUTHORS SERVICE

WANT Your Birck Pub, steel Lear to be we you all ader the , more districtly Many to essen Free booking Ph. has tone the West a New York

WHITEES Book Manus et is justed for pub attor on our some a stip at Greene h Book Pub shers. After Mr. Ibser 400 Fafth avenue. New York 17 New York.

63 AUVERTISING, AGENCIES. ETC., FOR ADVERTISEUS

PREE expert assistance for mellorder advertisers. Ratebook leading newspapers magazines the Chicago Advertising Agent Chicago 4

ADVERTISE 24 words, 100 Canadian Newspapers, 25 36 Lists Free. Advertising Bureau, 10511-P Springfield, Chicago 43

M CARTOONING, SEC.N. PAINTING, CHALK TALKS

HOW To Make Morey With Emple Carthons —A took giver store who likes to draw about him - It is free to obtain then it make the Carthons I make the Carthons Dept. 1994. Pleasant H. Ohio.

CARTOON your was to success inter a thomas a fix his interestion by the Burst was to reste of a Burst banker call on the Cont. I water it early low. Write for free data. Rank Burns Burns Burns, Burns Burns Burns, Burns Bur

No of Parishing Lasterna Do Mais Breeks On Letter good deaf Srew Lords Picternal Firsts High Trataset in 6366 burgs a Kansas (v 18 Manager)

LARCHINGTON Magnette Lessons
Marketa Free Bastiple Lattoonals Fi's
Cu forma Court Li obs 10 Netrasia

Yord ton Er ertain to b Charl Talks. Cataon 160 Cartoonist Saids. Cataonist Windows

PA NT Signs Master the cut out the letter uniterine C et piete assertment i chi 2 his prepuid \$2.90, Eyerly, F 563 Newton I wa

TYPE WICTERS & OFFICE MACHINES

TYPEWRITER. Adding Machine Bar sainsi Pres List, Woods Typewriters, Bedford, Pennsylvania

RUBBER STAMPS & OFFICE SUPPLIES

THREE line name and Address Metal or plastic part Case \$1.90 Mated Mail-ers. Post Office Box 604, Buffulo 5, New York

2 LINE 2 inch knob handle cushion mount, indexed \$1 M. catalog 25c refundable From 1 Box 412 (who were I was

THEFF line cushioned stemp \$1.00 E. dredge 1; do it we, 122 Resemble Arether Trenton S. N. J.

Address \$1.50 Catalog 25c. Brace's, Box 5 f. Fra & an Lore 5 Area.

\$ LINES \$1 00 4 or 5 lines \$1.50. (Any Word of Ann 1. or 16 ug. wedge s. 2 Lione). Clark, New Jersey

NAME Add res I lanes 1 00. Owens.

DIDEXED Cushioned 3 Lines 31 00. 4 Or 1 Lines \$1 50. (Script or Print) Pres Stock Stamp Circular 1 Day Service, Youngers Stamp Shop, Princeton, Iowa.

NAME Address 1, 00 Free Catalog Stn c s 79 tout Mr 100, Mass

AT PRINTING, MULTIGRAPHING ETC.

the Property Book of Pr. t. g & M & age by t & 15, 1235 bound \$73.00 6 M & page by t & 111 bound \$120.00 5 M \$2 nd r by t 712x216 bound \$135.00 Count Pre t 105 Court \$1., Strooklyn.

1.000 BUSINESS Cards, "Raised Letters" 43 50. Samples. Pieneer, Island Park #3, New York.

F She'll printing aswest price Bar gain catalogue—Decco. Box 2315-S. St.

M MERCHAPPETON Print of Quality Will Bear rable In on his indid for Bern C. r. e. New Laboures Conter H. Y.

PRINTING Photo-offset, Letter rese Mr melas tal hampira and Let as Madmel I for reach

OFFSET Frantise—66 75 1006. 8 2411. 26 hour service. National Letters, 251 West 42 St. New York 36 New York

H S HESS Pars and Pri ting Tabe s B bler Samps A entires at a ed Casa of P se Brone che B Clerk Jerses

506 hands 2730 it live garmed at kers 50c. Red Burder \$1.00 Mortis Printer has not Missing an

PREE Catalog Post, and Printing. D M.

36 PRINTING DUTPITAL REPPERS

Simple rules We supply everything Print for others good profit. Ruled printing like or staving loo. Have bone shop. Details few Kelley Presses V & Metiden and

PRINTING Presses, Type Supplies, Lists 3c. Turnbaugh Service, Mechanicaburg, Pa

RUBBER Stamp spaking presses, hydra a operated electron a beated flow and flow 2 10 x 2 attention outsite. Ad a rate on some Contour Manufacturing ou-M Jeffers of Age agheld 2, Missouri

MAKE Your Own soil mold is subject statum and priving such Plearubber A 17 c 2. Window

PATENT ATTURNESS

C A Series & Co S art P new Buttertest Wash given (D C Regardered Pal-

INVESTMENT Without obligation, write for a formation can always the Month of the state of Patent John Radio of Registered Patent Attacks and Common Radio Washington D C

INVESTION Record form free and Pater! Internal in Refer Investor Should Have Car More Registered Paters Attacker Was worth But died New York

INVENTORS — Take these preliminary steps toward patent protection, 5ketch as 4 describe your invention. Sign, date and have this disclosure witnessed by two people who understand your invention have us make a preliminary search among U.S. patents already graphed for similar tops of there is We report on the probate entend your further course of action we expend your further course of action we expend for its entend your further course of action we expend to be in the first of disclosure form that a first two disclosure form

"NATE TO THAT I was the protect your intercept." It was the rivertor to intercept a compact for the protect market he about the compact at the compact in the part of the protect of the first the U.S. Pate the configuration of the layer and to serve a the first the U.S. Pate the configuration of the layer and to serve a the layer and to serve a the layer and to serve a the layer and layer

INVENTORS—If you be see to a large an invention, you should find at his to perfect it. The firm of his history with name as the time of the invention with our reason. When see or life in qualified to take the received state of a four his of the perfect in the state of the second sea and it will not be added it will be part on the second for the making it is not a four his organical for the making his organical for the making his design of the second for the second fo

Threntian" tree on request, Frank B. Ledermann, 154 Nassau Street, New York City

FOR INVENTORS

THE PROPERTY AND FOR PROPERTY IN THE PROPERTY AND A PARTY OF A STATE OF A STA

INVENTORS, if you have an invention for sale, patented or unpatented, write Institute of American Inventors, Dept. 204, 635-P St., N W., Washington 4. D. C.

INVENTIBLES It is free in registered to practice before the United States Patent Office and available to assist you in the preparation and prosecution of your patent application. Patent Protection for Inventors' booklet containing detailed information and steps to take toward patent protection sent promptly upon request. No particle in the state of the s

INVENTION Record form free and 'Patent Information Every Inventor Should Have." Carl Miller, Registered Patent Attorney Woodwarth Building, New York

INVENTORS Without obligation, write for information explaining the steps you invention. John Randolph. Registered Patent Attorney, 304 Columbian Blog Washington 1, D C

INVENTORS Don't sell your invention Patented or Unpatented until you receive our offer, write Cowgill, Box 200, Marion. Ohio.

N FMT() I faith how to protect your train the Uniess the inventor is familiar a ff afect matters he strong of many a secure tea and pater tea or ten we are ten matter to the way and prepared to be retained to be retained in he shared to be and prepared to be retained in he shared the line test of the line test or testing data of information of the state with the state of the first test and of lines too form with the forwarded to you upon request—without obligation Clarence A thrief is Harvey Jacobson, Registered Patent Attorneys, \$2A-A District National Stateling Washington, D (

INVENTIONS wanted now by my Marufacturer-Cheats Patented Unpatented. Write schert Adoms Patent Broker 10-B Wall Street, Pinancial District, New York

GET your invention on the Market, You will meet manufacturers looking for new products at the International Gadget Show Write to International Gadget Show, Inventors Div., 394 East 23rd Street, N Y C.

INVENTORS—If you believe you have an invention, you should find out how to protect it The firm of McMorrow Barman a Cavidson with offices in Washington, D.C. is qualified to take the necessary steps for you Bend for copy of our Patent Booklet. How to Protect Your Invention We was as a discount of the Advantage Adva

INVENTORS! Have you good patentable, deas? Write Mr. Metalerr, 11 West 42nd. New York

INVENTIONS protected without Patenta Tekservice, 282 Woodcilff Station, North Bergen, H J

C.C.PNER Court dean. Posters 3 81 80 47 W. c. wood Part A tech. 12 Tech.

PATFNT Searches including copies of nearest patents, \$6.00. Reports airmailed a cot hours lidere than 100 registered; and the cotton of the model of the literature for the literature f

INVENTOR & Guide" and Prierd of Invention" Pres on Request + s a B Ledermann 154 Nassau Street, New York City

PATENT Searches \$5.00. 48 hour airires. Write Patent Engireering Service. 711 14th Street N.W. Washington S. D.C.

PATENT Searches \$5.00 45-hour service Free Invention Projection forms. Write Raymond L. Smith, Patent Searcher, \$20 . Ho d g Wa g' n b a) C

I INVENTIONS WANTED

INVENTIONS wanted Patented unputented Tremendous Manufacturers lists Global Marketing Service, 2420 77th, Cakland 3, Calif

IN ENTERS He ded department for the rest ested our assistance in he atterned to the second to Complete to the second to Complete to the second to the Second to the Second Inventors. Dept. 30C, 435-P Street, M. W., Washington 4 D C

INVENTIONS wanted now by my Manuis in the first Unpair ted Write Gilbert Adams. Patent Broker 40-R Wall Street, Pinancial District, New York City. INVENTORS Don't set! your invention! Patented or Unpatented antil you receive our offer, write Cowgill, Box 200, Marion, Ohio.

INVENTORS If you have an invention for sale patented or or patented as to for free brochers out, our man man facturers rethe remarkable from the rates Kessler Curporation, 721W Premont, Ohio

INVENTIONS Wanted 'Patented''Patent Pending' 37 years experience
Promoting Inventions National Service
Bureau, 2122 Meramec. St. Louis 18. Mo.

SELL or Licensa Your Invention. Show it in American Largest in vertice Casalogue Berving Malacha turers W to Palacian A J Malacha & Assumpton W. Market Birect. San Prescue S. Canfornia

ATTENTION Inventors: We extend our invitation to ear hit your mire than at the largest international the some Ext. bitton but is held during the 1856 World's Fair of Brussein Beig, im N in Pr. I would be de market fac these Contact Otto Witt, Official American Correspondent, Box 1451. Milwaukee 1, Wisc

SUPERIOR promotions. Patented, uppatented inventions. Informative bookiet tree. Superior 334-342 North Rodeo, Bergriy Hills. Californ a

64 MODELS, MODEL SUPPLIES

LIONEL Trains, Big Discussets But of a Pres. Catalog. 25c Ma h Bruthers 3641 Chicago Ave. Chicago 22

SHIP and yacht model first par buspricts Send like for in astrated catalog FM danng hundreds of Nems A J Pisher 1993-2 Etowah Ave., Royal Oak Mat can

SHIP Models blost complete line to New Ele a d Esta fillings plats books tooks eing des moders 1978 i natra ed catalog six James B as and Colland Dept 178 342 Atlantic Avenue Buston 16 Manala usetts

MODEL Ship Kits, Pittings and Plans Including Clippers, Trawier, Pishermen Prigates, Privateer, etc. Towboat of 1900 for H I Chance 17 ht New 1934 Cata of the Moder Shipways Box ht Specia N J

bout plans catalog 15c Ship Mudels Ltd., 186 Summer, Andover. Mass.

POWER Models. Unusual Steams. Gasoline and Traction Engines. Pittings. Melaid New Comprehensive Catalog \$1.90 Charles Cols. Venture Calif.

ROCKET Plans Simplified, One Dollar Model Rocket Society, Degracoos, Minnesota

STEAM engines, botters, castings, Catalog 250, Auton Bohaboy, 2287 Price, Rah-way N J

MINIATURE E green Common and Steam Base Flore on Your Word That at I sateled Common Lot or Came at Bucprasts Fr. on ste 12 v 10 Or a Maca PO Hop 526-PH Park Roose Lances

HOM KETS - B and Y sur Own Working ; Mide a 1 and 2 Stage F . Detain a. Countriestor Fue a ste \$100.2420 Bloss ton, Columbia, Bouth Carolina

Ji Miles M de inti Cata de Airpia es Biente Cara In Mairiand Ille i 10 200 Lienta Baranino List Free America H obs Certer 1481, West 1284 Street New York I New York

45 HOME CHAPTSWAY

ALL Crafts, Supplies, Large Free Catalog National Handleraft, 199 William St., New York 33

WOO! WO. KING and Cattretmaking rounse for beginne and advanced home craftsmen. Only complete low-cost home training program available. Write for free bookset Interstate Training Service, Dept. O-2. Portland 12 Ocegon.

FREE New big martisfed calling Leatherfull. Meta ratt Woodcraft has bid many on Complete stock top throne intest stress Wite today J.C. Larson Co. Dept. 7736. 870 S. Tripp, Chicago 24

OVER 900 Woodworking projects Books and patterns. Free catalog. Craftsman. 1.5 C Worth Street New York City 12

PRAM "Do-It-Yourself" Leathercraft Catalog Tandy Leather Company, Box 76: E25. Fort Worth, Texas.

101 PATTERNS of amort gifts nove the chelves, action windmills. Plus Make Money Jig Saning 3, 00 Mastercraft, 258, 1041 Olcots, Chicago 31, Illinois

Bull'AREK NOTTERN Make beste hand bugs, in cards dog leastest etc. Special offer Bestimer's book rataiog and quasity ourd tan ples 25c. P. C. Herwig to Tield TI-P7 38 Henry Mt. Brooking 1 New York

102 SMALL Woodworking Projects \$1 Edgm. 446 E. 44 Ave., Vancouver, B. C FREE Shelleraff catalog instruction book the Becor a, Bradenium Beach Fierida P 5

LFARM Art Meta craft and jewetry making Complete meapenaive home training course how available Special limits and malerials furnished Write for free book let Interstate Tva ning Service Dept L 2. Portland 11 Oregon

PREE Catalog 21 to Art at drawn Putterus Designs Craftpians 1322 B Walnah Change 5

A.S.E.M.B.I.R. Guntescent fixtures from nonfixers to bits. Child. of 19th Ships, for \$500 Franklin Ave. Nutic. 10. New Jersey

AMBRICICA'S must complete fit me Craft sup company Send 10. for his coarse of caraous Circa Kendali, Company Huntery) a Aubarra.

PREE Pathererell Catalog Kirk, at rick Leather Co., Box \$17-44, Guinta-ville, Texas

LEATHERCRAFT Quality leather tools total complete catalog 25c rehindable Midas, But 1235, Dept. Ra. Huntington, Park Ca forms.

KNOCKDOWN cedar chest and lumber free pine hat Bedt of Lamber Company has beaute. The cause

WOODE RAPTERS We But What You Make From Dur Patierto Eart to Make No Special Tools Needed Send 31 90 For Patier is and Company Fistractions Satisfact on Gusta teed Wm Row M Washington Ave. Kingston 19. N. T.

STYLECHAPT "Pretraced" Seather kits Handbags Budhids his area Be to Patterns in leather Just come assemble and one Preca sed hits six assemble and the Preca sed his six assemble for the locate by the Late Company 2006 E. Washington Bt. Phoenia Arzenia

120 F it she Armst drawn ignaw patterns 5:00 Craftpants 1322 B Wabsah Carago 2

10 IT YOURSELF

\$1.00 FLANS for rocket. Alutude 1008 feet, 500 construction. William Buruve Carleton College, Northfield, Mannesota.

CARAMINEATHER cook materials to history business this Was essentially 25c. Mason-Sullivan, Noroton 3, Connections.

Blul D Rivary Titler and Mover C in in rd of Separate K to and Parts. Mars Prieduction Law Prices. 2 and 3 If P Engines \$35.00 and \$40.00 Circulars F or Staw Do A I (PS). Generalis Katona

MA DC 80 Normal Patrick Mender Mende Retial of Patrick Californ Time Misses Sold Lew of Clouds Saves Time Misses Sold 3 00 of a served Masses Tall B Backman, Brooklyn 12 H T

ALUMINUM Carport Eits Build sir own Details Prest Carports, Box 2541 Sprevenort, Louisiana.

Billiblid) Plans for Block Homes \$1.00. Thompson, P.O. Box \$243, Tamps, Plan

LAZY-SUSAN Revolving Shelves Comparts Hardware Free Circular Endems, Res 6 5 H subspect 6 Content to the

OLD GOLD, JEWELKY, WATCHES, FTC.

USED and new watches \$2 up Free Last. Southern Watches, 5 PS So. Wahash

Cost ME Jenstry Supplies. Settings Schmest one etc. 55 page Mustrated ontabe 25 Mondy Son 1228. G.P.O., New York City. 15

HIGHEST Cash For Old Gold. Bruken Jeas t. (n. 4 Teeth. Watches. Diamonds & se ware & sectacles. Platinum. Mercurit se information. Rose Refiners, Reyworth R.de. Chicago 2

HIGHEST Cash Paid for old Gold, Jewelry, Walches, Diamonds Stiver, Gold Teeth, 100% Pall Value Paid Immediately delister on County teed. Mall Articles Today Information free Estat inted 1006 Chicago Gold Smelling Co. E.E. Monroe St. Dept. 257 Chicago J. II.

PREE libustrated Catalog Costume Jeweiry Parts, Supplies Polson's, Box 52, Medford 53, Massachusetts.

TUBACCO & PUBS

PIPE Smokers. Write foday for free even opening facts about smoking. A surprise events from E. A. Carry. Dept. 12-8, Chicago 60.

FOR THE HOME

90

POAM rabber furniture custions—Fartory seconds 50 discount Free alang Perms Foam, 300-A Fig. Ave. Irrington, New Jersey.

ASSEMBLE natural looking plantic indoor plants from kits. Free information Arjayco, 1464 Hayden, Cleveland 12, Objo MAKE point atick to metal with "Metal Frent \$1.00 better makes a gallon At leading hardware and point stones of prepaid from Kiesn-Strip Co., P.O. Box 10084-C Men.p.iia Tetal

CENSPOOLS, septic tanks, outdoor totlets council deviderated with all digging pumping or moving Presidents Chemical Company, Company Buston 14 Massactusetts

HANDLE-Jiggler? Aggravated by Those Second Trips to the Bathroom to Stop for let from Handling? Resonationary Device dates Money Water Tempers Tro? Tested and Private by Over 1 000 000 Uners Atla him Second Even Dagwood Cound Do It \$1.00 Postpaid P.O. Box vid Minimums.

NAME Brand Metrhandist Calaine 25 Cents Batchelle Enterprise Common 1. S. C.

GETTING Married We Trust You Send for Our Circular Ray Putt, 1646 Dyre 54., Philadelphia 24 Fa.

10 OF INTEREST TO WOMEN

toOOD Moret In Wearing Weave rage at once for neighbors on \$42.30 Urgen carety. Theorems of design at Society free Callett Co. Power Street, Bookst's New York.

MAKE 6.5 to \$25 week addless on on research to the transfer our trients he I'm 6.68 Cleve and I Of a

ORESSES 34c at on 39c Men a act to 94 to 1. seems \$ 30 Berlet used confeo 6 Free Catalog Transmiss 164 T Clinicipier brocken 12 N Y

60 PROFIT On Commeters Familias not control advertised her swood Control a part of the first of the foreign for the analytes details in the Blades Outs Communication Dept. (182) a

MARK 5 5 to \$305 south tiese showing friends neighbors mement of the new season to be up to be season to be up to a factor before a season to be up to a factor before a season or season to be up to 50c on every \$1.06 Send no money 2 beautiful assertments on approval. Rush name. Wallace Brown, 11 R. 36th St., Dept. A-242 New York 19

Addressing Envesion, Postcards, for Adversing Envesion, Postcards, for Adversing Further in matter, Pres Main 437-C Woodcard Lage N J

wit Pay \$3.40 lb. dried Grow Mush rooms. Cellar shed and outdoors 25 a.e. fur time year found We rate 25 and customers Pres Back Wash upto Mash set lad Dept 18, 2854 Admits! Way Seat le Wash

Mt NFY T t g Sewing Details Free Forenda, 2012-PS, 12th, Dea Mulnes 13, Ione.

\$200.00 MONTHLY Possible. Sewing Babywest! No house selling! Send stamped addressed ensologe Cuttes was send to it data.

TYPUSCS Addressers Farn at Home Free Details Lists. Box 437 AC Fort Mades a lower

11 FOR BALK MINCELL ANEOUN

WALLETS Pigatin Calf Merocco Imported Leathers, Box 104, Nyack, New York.

IMPORTED #45 Roller Chain 3gg / Pitch. \$50 per Foot. Irvine. 5 Laurel R =4 Demozest N 2

RING-Valve Job while driving, 24.00 Literature, Moteloy, Grantham 27A, Pa

WANTED TO BUY

TOP or en paid for old optes of Popular Science need of a langua from period 1889 to 19 5. If hooks are compete need to ugh toods on a not perest please with us and describe what his have Do to be and the teste of the in here from unwrite to B a 104 Tackshop New York.

O' ICKollevick, platinum, silver gold. O'es analyzed, Mercury Terminal, Nor-

5 TATTOOING SEPPLIES

LFARN or "table fascinating Tatlesing Free distraced is stration Zeig 'U.B. Leelie Road ed, and sta

GEIGFR COUNTERS & TREASURE FINDERS

PIND lost of hidden frequire with new improved metal de exice. No grow of prik up A so underwater metal detector inceingrature Cardiner Electricies Dept 1 2°45 K lindsan fichios Road, Phoenia Arizona.

COLD silver metal detectors Geiger counters for uran on. V.o' see Hemational new fully guaranteed models None & er Information free. Detectron Corp., 5528 Vinciand Ave., North Hollywood, Calif.

PREE Literature Lightweight, guaranteed Metal Detectors. Genjer Counters and Minera ights If it and Assembled Modess Electronic Applications, Dept. 6, But 0. Arlangton 10 Virginia

MONEY In Hidden Treasure Find MONEY In Hidden Treasure Finds
It With a Goldak Treasure Finder
Send For Free Literature on Compete
Line of Mineral & Metal Locators. Under
water Detectors Etc Priced as Low as
164 50 In Ce *bratton of Its 25th Year
Guidak Co Introduces New Translator Inalruments for Greater Benauty to Less
Weight Low Cost Flash ght Batteries
Write for Information Tuday' Goldak Co
Isan W. Carnacks Rivel. Guidak Co 1540 W. G.enoaks Blvd., Giendaie, Canf

WATCH REPAIRING

WATCH and clock repairing books Free cetaing. North American, 2006-BP, Mil-waukee. Chicago 47, Illinois.

WATCHMAKERS' Tools, Materials, Supplies, Watches, Catalog, Cales, Box 1900 Chicago 90, Illinois

WATCHMAKPRS' Journal Instructions and other valuable information for watch makers', students, hobbylats. Sample copy 20c Pean Co. Box 12.1 C, Daytota Beach Profide

MISCELLANEOUS

STENCIL MIL-Your Name and Address. Ink and Applicator Rass to Car on Mal-box in plements Truck, Tours, Rush \$1.00 Kit Sent Promptly Postpard Please Print Carefu v Hedger Sign Com-ans 1219 N Cin ton Street, Decator List of

FREE Wholesale Catalogs Sporting Equipment — Cameras — H -mewares — Everything Ecoh-O-Mari, Whitpony 4. New Jerney

OUTDOOR Tollets, Cesspools, Septic new product Safe barmiess easy to use 150 000 customers your guarantee of satisfaction Mutter-back gustantes Postcard. brings Free Trial Offer Burson Labora tories, Dept D 23, 851 Witness Ct., Chi-cago 22, Illinois.

BEAUTIFUL Ball Point Pens with extra free rettle, 60c, J for 21 25 Park Products, Box 78, Highland Park, New

HIG interesting mails three months 25c year \$1.00. Harvey Teeple, Decatur, Indistrib.

SNOW Cone Machines All Prices And Bises, Special For Grecery Stores. Box 7803, Dallas, Texas

PREE Literature - Muke Sig Money Rate by Pishworms and Crickets. Carter Parm 12 Pisins, Ga

THE Bible in Story and Pictures 2 Vol-Bouth Care na

COLLEGE Students, Teachers, will pay Resnutch. Box 12. Mass c

GERMAN Cuckon Clock \$2.00 Gray Company Box 948-PS Vallejo, Calif

RECEIVE-Magazine Samples. Mails, 1 Catalogues, Offers From Everywhere Get Listed 25c Rotick & Cancinnati 28 Ohio

WE Pay \$3.50 lb dried. Grow Mushrooms Celiar shed and outdoors. Spare for I time year round We have 25 000 customers Free Book Washington Mashington Ind. Dept. 183, 2654 Admiral Way. Scattle Wash

TOY Soldiers, Cowboys Privates \$1.00 per Hundred Jhal Enterprises, Olanta, South Carn ina.

FABULOUS Opportunities Pleasing of its 25c Greyhouse, 1909 Monmouth, Ventnor N J

BUY Whosesale' Over 10 000 Nationally Advertised Products Appliances, Cameras, Sporting Goods Housewares, Watches Toestriers Tools Cothing etc Bend Postcard Today, Buy-Rite, Box 258, Haw thorne 6, New Jersey Bend

690 00 DAY Selling Jewelry, Novelties. Jukes, Novels, 10c Items, Free Catalog Burke Associates, Manchester I, Mass.

CIOARETTES- Improved rotter mates 20 for Sc Fa. is free Moberly, Box \$11, Owensburn, Kentucky

IF you have a product or service that can be operated on a mail order basis write me lods) I was send you a Prec Est on How To Make Money Out Of Classi fied Advertising Nest labor will be April C sens data Pebruary 21 Horry-Do it Tiday O K Kr > Classified Adv Mgr Dept 20, 250 Fourth Avenue, New York to M Y

THA WESTERN MERCHANDINE

PRES Catalog Western Wraz, Saddies Boots, Leatr et Sunt ien Siner Sour Bon. 1 65 B25, Purt Worth, Teans

PERSONAL

HOW Can I Plud Out? You Can! Information confidentially developed Any matter person or blem World vide Of-fice ly licensed Established 1922 William Herman ."O Broadway New York

LEARN While Asleep! Details Proc. Research Association, But \$10-E. Omaha.

PROBLEM Sufferers' Discouraged? Write for Free important information to-III Ohio

Ditt is Sundries Wholesale Men. Wom-en Lightrated hat 25c coin P. P. Ally 1.33 E noit Buffalo & New York MEXICAN Legal Matters A. Espejo. Box 23t PB. Hermosino Bonoca, Messey

PAY Your B. is Now Borrow \$100 00 to

\$600 00 Cash by mull Easy quick private Repar in small monthly installments over 20 months Your pa mente may run !, less than now have money left ever to spend Loan Order Stant mared Free in pain envelope Advise amount needed State Fittagge Co 227 Securities Bids, Dept. B 127 Ottisha 2 Nebr

12011 BIBLE er Write Bar Tent, M vest, Jefferson, City 2, Missouri

HERB Doctor Book, Particulars free. Berbal Products, Quicksburg 8, Virginia. KNOW Anyone's Weakness, Instructions

25c Coin. Wayne Waldo, Jefferson, Iowa YOUR Chances of Living" computer \$1 00 427W Lynwood, Ban Antonio 12, Team

LAS VEGAS, Nevada Largest Gambling Center in World Six Weeks Divorce, Con-fidential Remails 25c 50 00 Mg Cassaided \$1 00. Unique, Box 1376

EYE Tiredness? Night blindness? Eye Vite Months supply 5, 50 Willy's Lab Irc R 2 Box 420 E Months. In

RECEIVING Forwarding 42 50 Month. Remain 20: Koerper 5528 Thrush, St. Louis 20 Missour;

MIAMI Florida-Remarking 25c, Monthby ra ra eva, able Sunday Class Ord \$1 00, Scenic Postesida 12 for \$1 00—Sam Lynns, 6015 S W 45th St., Miami 25, Fig.

SINGLET "Numero-Astro Puture Mar-

PARULOUS R tal Je'ly Capsules Now Ava able H. Potency Dietary Pood Sup-plement. No Doctor a Prescription Neces-Outrableed or Money Refunded in 16 Data Goods Vilamin Co. Macon 4. Georgia.

WASHINGTON D. C., Remails 25c. Laphant Enterprises, Sox 101, Lapham,

PLORIDA - Opportunities. Classified Ads Maked 5: 00 Letters Remailed-25c, Divorce Attorney Contact-11 DO. Carnetion. Box 1002, Winter Park, Florida.

MEXICAN Law Ceneral Practice At-torney J Coniceros, Auto. 79. C. Juares. Cl. h. Met.

LETTERS Remailed 35c J Lors, 1418 E fird Los Augents 2 Cultiornia.

SPEED Learning How to Learn Pasts Save Time Money Compate Course Including Speed-Tester \$13.95 Satisfaction Contacted Practical Dynamics, Box 176, Washington 4, D C

SALE Your Hale Through Exercise 10-Detr 31 21

ARTHRITIST Home drugless method. Por youl Complete instructions, 22 00, Leo Stuever, 106 Maple, Excelsior Springs, Mo.

MIAMI Remails 250. Color Scenes, to Esquedy, Box \$21, Miami \$2, Florida.

May broud h united 10 month. Hedgorth, Box 630. Albambia 24 Call

VITAMINS—Save 45% Buy Direct. All Pormulas Free Catalogue. V,takpec. Box 4435-8. Phriadelphia 40. Pa

BOLOBAM Defensive quick-knockout fr ke " Swiftly lear and Ones in \$44-56 Sunnyside, Change

y to " Tele, a RULE others - th Wad or Bits of

Here You Can Find a Solution to Practically ANY MECHANICAL PROBLEM!

Acrumulatora Gauge Air Conditionate Grare Alarma Amplificati Governmen Governmen Grimders Anchors Ant Frietlan Baffies be I Joints Gripe Gu det Man op H un gibere H un gibere Indrestura Indrestura Indrestura Bearings Sed P ston District Section 1 Brahra Cres cress andres Inhe CalMa Chains Gases Checks Lacture Charles Interesting Assessment Mailine Magnet on Manager and Ma Cleaners files with Clu ches brat Comp' round Air Min of Conserved Both M 4ors on sea

Corers. Crunca

Country Culting Culting Decriebs Diese Power

Deliting Electric Power Electron Tubes

Enginera Enginera Enpandora Lade ne ra

redera

PARTIAL CONTENTS:

Notes of Perce to Medicate Page to Pipes jets de Project clans Pumpe Ra e nes Rainhele He steerstless Herr spicating 36 st sp Remarket Racket Propulation Infety Devices Incoloring Devices Scales See Were Power

Some rategy. Boar our General Mise ide St. - b Abburhart A spale St. Ged. Francis Springs Street by Street Pe Stokers Satrola Striking Frand Receivers Toppets Thermostale Trapa Valves

Vaporiogra.

W million

A rope belongs to every reference attemp, priori exercidas p ant factory-with ex-ery mechanic engineer, pludged, levening,

If pad work with marktory of pay hind you may be raited upon to let be or may be raited to be the or may be raited to make the first the paint of here have to be an end-then extensione or mayon by Here in the mass beach This IN. At lice Till this, he are the here in the here in the here in the here in the here is the here in the here is the many and at the course of the state of the many the same and the course of the track of the many the many here is made in the her and the many the many the many the same and the course of the track of affect may be a made to the first of the many than and the course of the track of affect may have at the first many than and the same and the course of the track of affects and and the same and the course of the track of affects and and the same and the many than a course of the track of a same and the same and the course of the many than a course of the same and the course of the same and the the set of degree of attention of the state of the set of the set

A BOOK with OVER BOOK ILLUSTRATIONS DESCRIPTIONS

of Mechanical Movements, Devices, Contrivances and Details

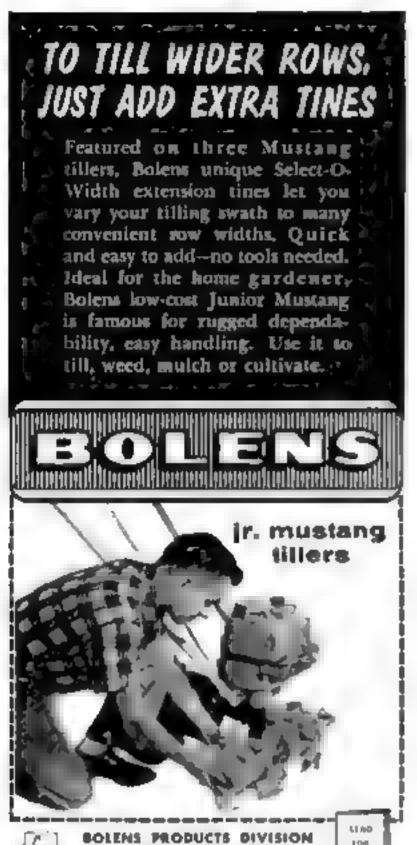
weate on Joseph and I pour amodel

Order By Mall Name:

Profits graphs hara If par

to a report of the work it is a sire of the second of the to be the person of the best of the testing of the person to the This per view metang t 4 Cappers

4410



food Mach nary & Chemical Corp. Part Washington of, Wisconsin

124 CATAMOS



Dealers Write For Distrib Info.

it a big to ade samply outside lideal second car of Sourtabled Full rout and Written guerantee. Most

ble car features WRITE FOR FREE LITERATURE

ERHELMAN CO. Bopt, 201, 109 Light St., Balto 2. Md



Sauf Cash, Check as M.C. De C.8.9 J. No Canada Brillers. Juli 6%. Notes Tax às Catalornia.

28.55-52 Farbier Areano, Long Booch 18, California

1.000.000 IN CONFEDERATE MONEY.



millionaire with money to burn. You can do everything with this money except spend it A million hucks in \$10's, \$20's, \$40's, etc. in

bound to goodness authoritic reproductions of genuine I retter or cigare with a ten-spot, You get a million for Confederate money plus bonus hills. Light your ciga-\$2.98 or four million for \$10, Postpaid Best Values Company, Dept. M-238, 403 Market Street, Neugels, N. J.

50 Models 8' to 18'



LUGER INDUSTRIES, INC. 9200 Access Rd.

Free Catalog in Full Color vertibles, fishing: \$41.75 and up, Freight pd. Luger boots equal factory built, yel save you to 35 cost Methods ossure a perfect assembly by anyone FREE color zatalog in cludes. Fiberglas, trailers, points, hordwore, acces-

> Dept. A-2 Minneapolis 20, Minn.

\$ ON U\$ GOV'T \$URPLU\$

Our publication "Government Surplys Spins" lists. tramandous savings, as law on 1c on a \$1.00.

These are samples of the savings that are being made

TRACTOR ...

\$12.00 \$75.00

GRINDER . TYPEWRITER

.. 57.51

. \$15.00 SHAPER PRESZEE \$50.00

DUMP TRUCK SPRAY PAINTER

\$76.77 . 515.25

Hundreds others listed in our builetin "Government Surplus Sales" and may be purchased direct from U.S. Covernment, Hunting, Fishing, Camping, Sporting Equipment, Photographic Equipment and Supp.ics, Radio and Electronic Equipment, Amphibious Trucks, Jeeps, Boats Motors, Binoculars, Plumbing, Electrical Equip., Cars, Power Tools, Machinery, Chemicals, Furniture, Office Equipment, Supplies, Scrap. Etc.

MOTOR54.00

How may you receive our bulletin "Government Surplus Sales?" By sending \$1.00 to

GOVERNMENT SURPLUS SALES,

P. O. Box 169,

Department 4-3,

East Hartford 8, Conn.

3 University WAYS TO BETTER HI-



3 informative booklets to help you se-fect the high fidelity loudspeaker, enclosure kit, or delicat speaker system best suited to your taste and purse. Here's a complete range of choice.... offered by the world's largest custom londsoenker manufacturer.



P.S.E.—Progressive Speaker Expansion

Most revolutionary development in speaker history, P.S.B. shows you how to start an excellent basic system now at low cost, and build up to a superb deluxe system at any time without discarding original components.



SPEAKER ENCLOSURE KWINIE

Best for design, construction, case of assembly and performance. Substantial savings for do-k-yourself fans. Outclass many "factory-assembled" enclosures.



SPEAKER SYSTEMS

Designed to meet every listening coquirement, every decor, every budget . perfectly integrating the most advanced loudspeaker components with precisely crafted decorator cabinets. You haven't heard University Speaker Systems. Write today, Hating hopklets desired.

UNIVERSITY LOUDSPEAKERS, INC. Desh B.J., 20 So. Kensico Ava., White Plains, N.K.

University sounds better.

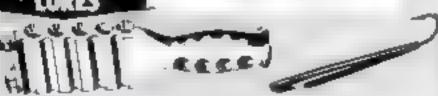




It's fon, it's easy with Sweet's

Me ds for fresh and salt water fishermen Handled and hinged for easy, fast operation Over 100 Irpes, 500 as 10w as Write for 11005 FREE coralogue TODAY. per mold

SWEET'S MOLDS TONAWANDA 31, N. T.





Onan Emergency Electric

Start automatically when highline power is cut off, supply current for lights, heating system, freezer, water pump, stove, all appliances and machines. Prevents losses and hardships. Plant stops automatically when power is restored. Compact, easy to install, 500 to 75,000 watts A.C. Priced from \$319.00,



PORTABLE

500 to 10,000 watts. Supply plug-in power onywherm!

Write for Free Felder

3596A UNIVERSITY AVE. S. E. . MINNEAPOLIS 14, MINN



1000 AND 1 USES!

Miobored by

Super-glues "enything to anything" — super-quick! At chain, hardware and hobby stores everywhere. Pliabond -T.M. The Goodyear Tire & Bubber Company, Akron, Ohio



Now's the time to pick out your Starcraft Boal. Twenty-four pages in color showing sixteen new aluminum and fibergias models. Get your copy now. Write:

STARCRAFT BOATS

Dept. N-2, Goshen, Indiana



14' Barracude, kit \$268. Other models, \$61 to \$1156

- As low as \$61!
- Save 1/2 or more!
- 20 models 8' Pram to 22' Cruiser
- Over 100,000 in use!
- FREE CATALOG

Chris-Craft Boat Kits are packed with advanced design features that spell BIG VALUE: Flite-Speed styling, wrap-around windshields, fiber glass cabin roots. Highest quality pre-cut, machined or pre-assembled parts and simple directions make assembly quick, easy—and fun! See dealer or write for brochure. Distributors, dealers: valuable franchises available,

Prices subject to change.

CHRIS-CRAFT COMPARTAN Boat Kit Division . Pampana Banch, Flo.



\$4.00 Worth of Sand & Cement produces this Attractive Fireplace.

Own Backyard

Salls on Sight from \$60, to \$80. Easy to start your awn Profitable Businuss.

The General Pfrapiers Maids and Process are the most nmazing and factorout ever savented

BIG DEMAND!!

Sell all you produce to Department Stores, Homoswapers, Parks, Nurseries and Picnic Green Fireplaces sell on eight No experience decessary. We supply full operating instructions and equipment plus the know-how that spails HID PROFITS. This is no outstanding opportunity for men of vision and small capital to get into a hosy rich paying held. Don't delay, be the only exclusive manufacturer in your own home town Wall soupon at once for full details as to how you can family your territory. Malds sold only an exclusive fronchise.

GENERAL ENGINES CO., Inc., Dept. 5F-28 ROUTE 130, THOROFARE, NEW JERSEY

Mr. Tor of Philadelphia writes. Sold 250 in first 4 months. Selfing to Sears Roebuck, John Wanamaker, and Gimbel Bras. in Philadelphia area.

Link	***************************************
Address	
City	Zone
State	

These ALL foreign short wave bathle. Landon, Parts, Blosene, Australia, All. Areateur bands too to to meters! All. long of a temper Air Force and Air Line aircraft Ships at Sen, AF oversees broadcasts, State-County Police. Industrial, hands t S. Hadis broadcasts. State-County Police. Industrial, hands t S. Hadis broadcasts. There 500 RC to 40 me. 600 to 7 meters NOTHING LISE IT ON THE MAILE SELF. ANY WHERE AT ANY PRICE Super regenerative Receiver. Short antenna included-tion up in 1 meters! Politarie Self. Containing the modern for Boy Sengia tournal, weathons, amarches short wave integers. Eventyone Can now that, weathons, amarches short wave integers. Eventyone Can now the first wave integers. Eventyone Can now the first wave integers. Eventyone Can now the modern wave integers of the sengia tournal contents of the modern postures. Its Eventyone Can now the first wave integers. Eventyone Can now plete easy to mire but includes at parts, lobes, broadcast rol pinnicks and reliable to the first price for the first posture. Its foreign and the posture of the posture of the posture of the pinnicks and the first posture of the postu

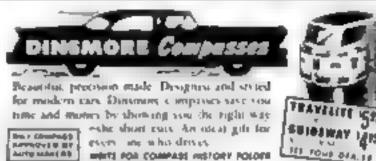


ANOTHER OF INDUSTRY'S

MOST-WANTED MEN

Radio-TV Technician-many excellent positions open in manufacturing and service. I.C S. training can help you qualify within a few short months.

SEE SPECIAL OPPORTUNITY CHECK-LIST - PAGE 51



DUKSMORE IMSTRUMENT CO.,



Get Sports Car Snap, Economy!



For peak performance with better year off mileage and mores engine? If the and drive your car by (acceptance like professional test and race drivers! Fincers Each compact self-contained precision electric tach. gives top tuning and operating courses at gives top tuning and operating courses at gives care for it engine a any car quick each to losses? I modes Top values, Write for Resture today?

DIXSON PRODUCTS CO., Dapt. AZ, Veshen, Wesh.

FOR BETTER WATER SKIING

Fit your extboard motor with the MICHIGAN PROPELLER designed to give you greater thrust, quicker quilups, more skippy heoyancy. Send post-card for your FREE copy of our new 1958 OUTBOARD CATALOG. NOW! IL pontains propoller recommendations carefully angineered to provide better performance for every spaeifie molar-hout-load combination whether for skieng, speed, cruising or all around operation. also, fine time of skis, beat accessories. Grand Hapitin 3 Michigan

B4 POPULAR SCIENCE

≁ATOMOTRON

First Model Acom Smasher!

NOW

See and learn the wonders of Nuclear Physics and Electricity with minuture high-rollings generator. Make artificial lightning pallers sure at a distance. Only 6" bigh Penduces 75,000 rolls on a 2-such drameter sphere yet as absolutely talk for the youngest child. Illustrated operation manual recluded

COMPLETE WITH FOLLOWING APPARATUS

- a Smog Control Unit a Field Reaction Rosor
- Paper Strand Cluster
- · Erectesc W and Unit
- · Prattic-encased Pub Ball · Neon Light Wand

Alomotron, battery operated, runs for hours on 2 flashight cells. Ship, wit 1 th Atomotron operated by sturdy 110-volt motor, actepled by UL, Ship, wt 4 lbs. . Alamotron, kit form, AC molor, needs only screwdriver to assemble. Ship, wt, 3 lbs Cash, shock of M C. Plus P.P. seets. (in Calif. and 4% sales tax)



ATOMIC LABORATORIES

3066 CLAREMONT BERKELEY 5, CALIFORNIA



Than by beach an effective substitute for dangerous hereing leaves to pertiture out intury and or experience Siles East TO headed liquidle as a prediction wideline Start of Siles CE STATIONS stend you'll not in fail time Start of wideline Small Stores and Small Stores and Differ or or place our extension with at age to the Center of the

HAGEN SUPPLY CORP., Dupt P-28, St. Paul 4, Minu.



In Stock -- Immediate Delivery

Clears, speed reducers sprockets, thrust bearings flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind Send us your blueprints and inquiries.

Send for Complete Catalog No. 220 CHICAGO GEAR WORKS 440-480 N. Oakley Bird. Chicago 12, III.

Gypsy Bait Oil MAKES FISH BITE OR NO

Mysterious aroma of Gypsy fish Bait Oil Compound makes smell feeding fish wild through thousands of smell organs covering their bodies. One potent drop on Artificial or live buit draws in fresh or sale water whether you still hish with pole, cast, spin or troll. Really works, Only \$1 98 (3 for \$4.98). Cash orders postpaid. If C.O.D. postage extra. Draws fish



for your bart or money back.
FREE. Handy large water research pouch with every bottle. Order from:

WALLING KEITH CHEMICALS, Inc. Dept. 501-6 Birmingham 1, Alobama





Tom Gallery,* Director of Sports, National Broadcasting Company uses and advocates the CITATION.

VIP's, Very Important People from all walks of life, find lots in common when they select a spinning reel for light salt water and heavy fresh water fishing. These particular fishermen, some who can afford to pay a lot more* and some who have to carefully budget themselves, all use the Johnson CITATION



The Johnson CITATION comes loaded with 125 yards 10∉ test mono-filament line and has a 24" retrieve. Can be used on spinning or casting rod. right or left hand retrieve, and has all the other features of the famous Johnson Century Reel. Your favorite dealer will be glad to show it to you.

THE DENISON - JOHNSON CORP. Mankato 64B. Minnesota



"OLD IRONSIDES" KIT! MODEL

Places send my FREE copy of Intact Arbagust color

catalog of bests-full of pictures of catches

Historic U.S. Frigate. Every deta I accurate-srmaments, spars, longboats with oars. Precision piestic parts climat, plans. 16 4" For cata og write Dept SF 4223 Giencon, Vanica, Calif

wherever. hobby kits are soid

Aufalrenze





State

Miss



CORCORAN'S

Fishing - Comping Hunting Catalog

Send now for your FREE copy of Curtorans Si ing Summer Cafe ig et a ston and its ned with hundreds of fully diturn at ed, meache, all field tested specialities for the 1.00013.75.03 bacits talke terds, boots and other dems.

Box P5-26, Staughton, Mass.

MUNITION

for a fraction of regular cost

Reload a whole carton for the cost of a few rounds of factory ammunition. New 200-page Lyman Reloading Hand Book shows you how, safely and easily. Ten big sections loaded with data and pictures show you how to have more fun with rifles, pistols, and shotguns. \$2,00 at your dealer, or sent direct postpard.



THE LYMAN GUN SIGHT CORP. MIDDLEFIELD - CONN.

4 SHOT



LOWEST COST FOR B 3 M P !

Lastras with a where afters any close to sell flowers. See the set of the set

GERMAN AUTOMATIC -22 CAL

@ Latest Medel • Chank Cartridges · Na Permit Enquired · Fully Automatic Self ejecting of p 2 ring spring adjustable Precis of make to the Sideral West service Consert the Sideral West service Consert the service Consert the service Consert the service Consert the Sideral Service Consert the Sidera



RE-POWER NOW with a Y-S engine-Use CHEVROLET MERCURY

in 2 or 4 Whilps. Jeeps. Jeepsters, Sta Wgn. Trucks N J and Naiser care Conversion Kits 543 25 to 550 83 if you want fast action tell us which engine you wish to use, give us year, Model. (2 or 4 Whilbs) of your vehicle Bend Min \$15.00 Dec. and wa will ship correct kit Bat, COD, Send full amt. for Prepaid Migment. Wire, whose or write for tree details. (Also kits for Ford 5 engine.)

214 S.E. Bit St. Phone CRE-2442 Pendleton, Gregon





CATALOG NOW READY



 Send for this complete presentation of the newest in boats, runabouts and canoes. Shows 26 models, including 2 new Aluma Glass runabouts, in full color exactly as you would see them at the big boat shows. See new styles, new ideas, new sizes with a range of prices to fit every pocketbook. Now ready. Write for your free copy.



Our design and construction have set many new booting industry standards for style, performance, sofety and strength, Aluma Craft require proclically no upheep. Write for cutalog.

ALUMA CRAFT BOAT COMPANY - 1521 Central Ave. N.E., Minneapolls 13, Minn.

FIREPLACE... warms every corner



air into the heating chainber at floor level, warms it circulates it around the room — no hot spots or chilly corners. The execusive Pressure Scal Damper prevents loss of winter warmth and summer air conditioning when fireplace is not inuse. Ideal for basement rooms, cabins and summer homes. Sold by leading

building materials dealers.

WRITE! FOR FREE CATALOG! Heathlator Div.-Vega Industries Inc. 862 East Brighton Ave., Syracuse 5 N Y



Taylor + tops 'em all



windshield beaute it's the Taylor-Made Honday then you can add the Top later

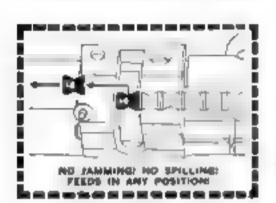


New glamour-styled VENTILA-TED Convertible for all-weather cruising comfort Bold, panoramic Windshield features new Speed-Aire Wing Ventilators for complete air-draft control. Top now available in White Vinyl Nylon' Complete range of stock sizes for a perfect fit on almost every open boat. Taylor-Made - by the leader in Windshields and Convertibles.

N COR PART CORE PULL COLOR SATALAS

MOUT COOL OU LOSS LOSS LOSS GATON PHINTED					
N. A. TAYL	OR CO., II	C., Glover	sville, M.Y.	Boot, PS-258	
Please send	free catalo	og of Taylor	-Made Produ	cts.	
Name.			,		
Address,					
L					





HERICA'S FORST PERFECTED PELLET PEZINNE AND LOADING ACTION

> Exclusive Patented SWING-FEED® with Load Indicator, and TRU-FLYTE® BARREL

Another first by Crosman-a Repeater Rifle! No more manual loading Crosman SWING-FEED LOADING feeds and loads ten pells automatically as you slide the bolt! Crosman Load Indicator pops out to show when chamber is loaded. Absolutely trouble-free, TRU-FLYTE Barrel delivers amazing new accuracy in pellet shooting. WRITE for colorful, new shooting booklet, Crosman Arms Co., Dept. PS-14, Fairport, New York.

NOW STOCKED BY GROSMAN SELECT DEALERS

Shopling is 3 Times MORE FUN with

e rosman Without Pawder®

Available in Canada

World's Largest Manufacturer of Pollet Rifles and Pistols

The 6-Transistor Portable That Plays Anywhere/



build your own

radio and SAVE

No other portable gives you so many

important features at such a low price. You get a 6" x 6" speaker for

"bro set" tone - 500 to 1000 hour had battery life unbreakable me tad batte cab not in No day Gray - ellip ont a tansister ordula and easy step-by srep assembly instituctions and pictor at dispress. Have

fun building and using this fine set. Shop Wt. 4 lbs.



MEATHKIT TRANSPETOR PREVABLE SADIO SIV

MODEL XII-1

(with unbinet, less batteries)

FREE HEATHKIT CATALOG AVAILABLE

Floritor in "do-1)-yearsall" electronics.

Describes many more "do if yourse i" hits for hobby. h f ham radioand experimenting Get your copy now for complete. selection of fun projects that save you money



时间八丁H COMPANY

A SUBSIDIARY OF PAYSTRON, INC. BENTON HARBOR IS, MICHIGAN a need First Manager & Patrice.

Limite band Little side Asiat Charles	
HAME	
ADDRESS	

the second second second second second

POPULAR SCIENCE

CITY & STATE

NEVER AT THIS LOW PRICE! 35-POWER with Achromotic Lens and 4-POWER FINDER attached

EXTRA BONUS GIFTS.

- · 273 page book, Mundbook of the Heavent
- * Magic Star Finder Diol
- 220X & 400X Eyepiece lenses

5 Magnifications 18X—35X—65X—85X—135X Brings the Maon, Planets, Stars, Satellites, Poople

135 times Closer, Clearer, Sharper
Never before has an At Hilliam ATH 135X releasing with
range finder and triped sold for abywhere hear the attenting
the price. New year and hot only explice the heavens an almost
the moon, planets, stars, sat Lites 135 times closer but you can observe all distant objects, people ships too, because all pictures are erect not appear down as a a lastice of a few scopes. The kind of needle sharp color free cess up uply a genuine achromatic lens can bring you. Ready for immediate use 5 piccision lenses bring you vision at 18X 35X 65X 65X 135X Tubes extend to 43° made of bake to Spished in camera be lows black trimined with a can ing brace, 4 power finder acope (30mm Lens mounted in the n take is fegture finder acope (30 mm) Lens mounted in main right is feature usually found on more expensive these per brings i ffield objects on target before observing with main scope. For extrastability 5 ft. hardwood 1. Ling triped is multipled with heavy cast arm no mount that books instability is any pest in the line able only from triter in the shipped propered. A famous anyth 2 3 target book. Handbook of the Havens. Mark star Indeed did that aids in locating stars ANYWHERE at 4NYTHM; of the year 220X & 400X by piece lenses included free for experiments. You must be completely satisfied with this super offer or your money buck in full Shipped 1 complete, making else to buy at amazingly low piece of \$10.98. Without triped \$14.08.

Send Cash, Check, or Money Order today

Send Cash, Cheek or Money Order today Dept. PST 24, CHITERION CO., 331 Chards St., No. ford, Cons.

Get your choice in the smart, new uniform of choice — MODERN ARMY GREEN



"CHOOSE YOUR TRAINING—I DIDI

"I found only the Army guarantees high school graduates their exact job training. There's a course for every need, and it's reserved for you before you enlist, so you're sure to get the training you want. I picked Diesel Mechanics. It was a great course that I could never have afforded otherwise. Your Army Recruiter can show you how to get the training you want, too,"

· Pvt. Victor R. Jones, Miller, Ohio.



"CHOOSE YOUR TRAVEL-! DID!

"I wanted to see Europe, and I found only the Army lets you choose your own foreign travel. I picked my exact overseas assignment, and it was even guaranteed before I enlisted. What's more, I enlisted with my brother and we'll stay together all the time we're overseas. You and your buddles can plan your foreign travel just like I did. Your Army Recruiter can show you how." Charles & Carrier

· Pyt. Charles R. Carrico, Springfield, Ky.



"CHOOSE YOUR BRANCH-I DID!

"I'm serving the way I wanted to, because I found the Army would let me pack the branch that interested me most I chose Anti-Aircraft, and I'm getting top leadership training in electronics and guided missiles-a really important field of the future You can pick the Army branch you hke the best, too. Just name it and it's yours - guaranteed before you

· Pvt. John D. Finsey, Colebrook, Rt. H.

Only in MODERN ARMY GREEN can you choose

PS-7-58



For details on how to choose before enlistment, send for your free booklets today. Or for immediate counseling visit your local Army Recruiter. He's listed in the phone book and will give you all the facts-at no obtigution!

Date of Graduation_

THE ADMICANT OFFICERS. Department of the Arnty Weshington 25, D.C. Attn: AGSN

Please send me the free Army booklets describing special opportunities that only come with Modern Army Green. Address. _State_



In Yalta as in every other city our American station wagon was a magnet for crowds.





By Harry Walton

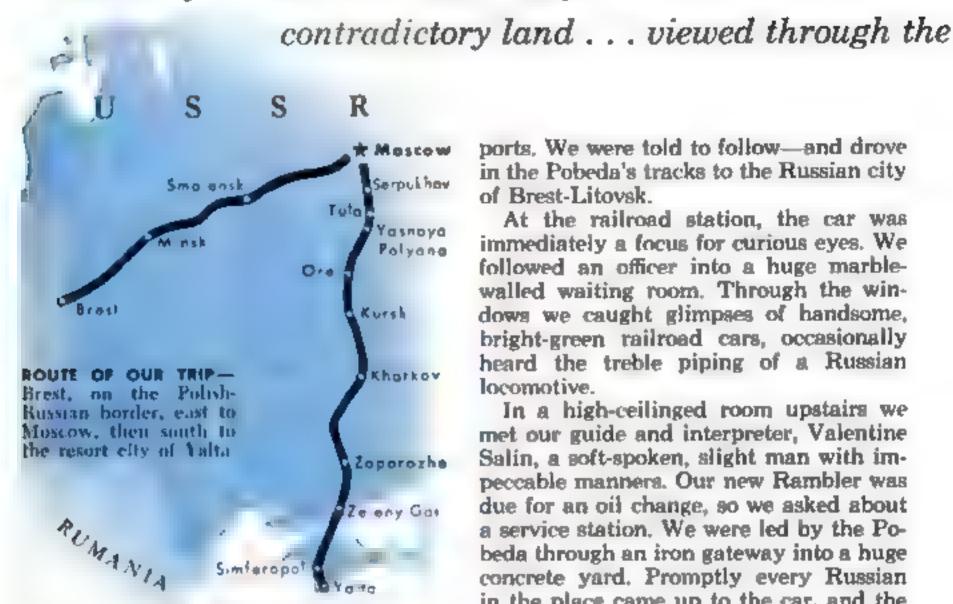
pulled up at the loneliest border post I had ever seen. This was the

other world.

As the first American Journalist to
the Black Sea—to such little-known
shead, I was to find a strange and



"Ahead lay Soviet Russia, a strange and



contradictory land—one of broad highways and tiny hamlets, of grim national police and obsequious service, of women laborers and pretentious hotels.

Rlack

S e a

Traveling with me was Dennis Michael O'Connor, a graduate fellow at the Yale Law School, who had a working knowledge of the Russian language. Our car was

a 1957 Rambler station wagon.

Cold, wind-driven rain fell from a gray sky as we rolled onto the iron-railed bridge that apans the Bug River between Poland and the USSR. Even before we reached the Russian side, a rifle-carrying young Soviet soldier stopped us with a stiff military gesture. I tried speaking German to him. He shook his head. I offered him a cigarette. He refused it.

A sudden gust of wind blew my hat off, and instinctively I started after it. But I was not to enter the Union of Soviet Socialist Republics so informally. "Nyet!" barked the guard, and sprinted after the

hat himself.

Shortly afterward a Pobeda rolled up, stopped smartly. A hawk faced young Russian officer got out and checked passports. We were told to follow—and drove in the Pobeda's tracks to the Russian city of Brest-Litovsk.

At the railroad station, the car was immediately a focus for curious eyes. We followed an officer into a huge marblewalled waiting room. Through the windows we caught glimpses of handsome, bright-green railroad cars, occasionally heard the treble piping of a Russian locomotive.

In a high-ceilinged room upstairs we met our guide and interpreter, Valentine Salin, a soft-spoken, slight man with impeccable manners. Our new Rambler was due for an oil change, so we asked about a service station. We were led by the Pobeda through an iron gateway into a huge concrete yard. Promptly every Russian in the place came up to the car, and the questions began.

Nyet, not Angliski, Aftomobile Americanski, Nyet, not Ford or Chevrolet. Marka Rr-rr-rambler (the Russians roll that first "r" with the best of them). Belgian plates because assembled in Belgium. Yes, new 1,951 kilometers ago.

Eyeing the drain pit with alarm—it was a deep gash in the concrete floor, with hardly two inches of guard rail—I drove over it under the stare of 40 Slavic

eves.

While O'Connor held forth to a fascinated audience around the opened hood, I clambered down into the pit myself. My notion was to make sure the mechanic drained the engine, not the transmission, and kept the copper gasket on the drain plug. I needn't have bothered; he did.

"Aren't you going to start the engine before putting in new oil?" a Russian asked O'Connor, "It works better." O'Connor told him we didn't do it that way. There was a little flurry, as air was being added to the tires, when the hose fitting parted. Embarrassed at this technological lapse, three mechanics scrambled around to join it, finally in desperation held it together by hand.

windshield of a U.S. car"

With goodbyes all around, we set formally off beyond the Iron Curtain. In the back seat was Salin—our guide, interpreter and (perhaps) private eye. I had an eerie what-am-I-doing-here? feeling.

My assignment was to drive 3,500 miles through Russia and report on how it differed from, say, a transcontinental U.S. trip. I started out with standard preconceptions: The roads would be terrible, the natives hostile, and I'd be in real trouble if anything broke on the wagon that couldn't be fixed by a tractor mechanic.

The preconceptions were wrong. The Russians I met were not hostile, and the roads and mechanics were first-rate. In several cities I met friendly, curious, wide-awake students, (including some who regularly read Popular Science in the technical library). Often I talked with earnest, unsmiling but not unfriendly adults who took to heart their government's much-repeated stogan: "Beat America." Everywhere I saw evidences of a dedicated national effort to cram into two decades the industrial revolution that has taken the West two centuries.

There is no speed limit in the USSR except through villages. The road east to Moscow is superb, more than wide enough for four cars abreast, with a well-maintained asphalt surface. Yet pedestrians, wagons and livestock made it imperative to reduce speed when dusk fell. In a land where the trucks rarely have working tail lights, you cannot expect them on cows. It is strange, too, that the country that first launched Sputniks hasn't given its bicyclists the humble but effective reflector button.

Tourists are privileged characters. In Minsk, we overlooked a no-passing sign and ran around a couple of trucks. Instantly an outraged militiaman (national police officer) thrust his baton downward in a gesture that would mean "pull over" in any language, and whistled us down, anger in every trill. We waited apprehensively as he stalked over. Our guide said

a few words. The militiaman saluted and walked away. "You see?" Salin said imperturbably. "He apologized."

You can turn right on red in Minsk but are not supposed to blow a horn. It is wise to beware of the red circle that means no entry, or else you may find yourself driving down a flight of stairs. Most traffic signs, fortunately, are pictorial ones, easy for foreigners to get.

We stayed that night in a grandiose hotel with an elevator about four feet square. Inward-opening doors on the car made things comically awkward at times—two passengers with luggage become a crowd. Control is by pushbutton, with an operator to do the pushing—and you either learn the Russian for figures up to five, or resort to the childish alternative of holding up fingers.

Rooms are big, high-ceilinged, with enormous double-sash windows and often a balcony. Sometimes the beds stand in a curtained alcove. Rugs and drapes abound but lack the cool smartness of those in Western hotels. Bathrooms are crude affairs with asthmatic plumbing and primitive fittings. The huge bathtub and generous towels are often negated by a lack of hot water. You can use an electric shaver if you have an adapter for the round-pronged receptacles. The juice is 50-cycle A.C. at 127 volts—on which U. S. shavers are willing to function.

Formal sightneeing was encouraged always. In Minsk, we stopped at the Park Kultury (Park of Culture) to see something called the Children's Railroad. The name is misleading, for it is a very respectable narrow-gauge line with several kilometers of track, signals, a dispatcher's office, real cars and man-sized steam locomotives. But it is operated by six-to-14-year-olds, who have to qualify for the privilege. There is class instruction, too, to be sure that the youngsters absorb information with their fun.

Good as the highways are in this part of Russia, they're no expressways. Herds



Rolling country in the Crimea on the way to Yalta. Trucks are the workhorses of Russian



CO-EDS DIG A DITCH in the main street of Simferope I on their day of free labor for the state Prettier than most women workers we saw.

they made a lark of it Russian women work hard not only as breatwinners but in daily food shopping that may take two hours or more.



logliways. The kilometer post (in center, above) and guard posts are standard on main roads.



BALKY BOVINES BAR THE ROAD, But patience gets you through, sometimes with the help of the herder Question. If a state-owned truck kills

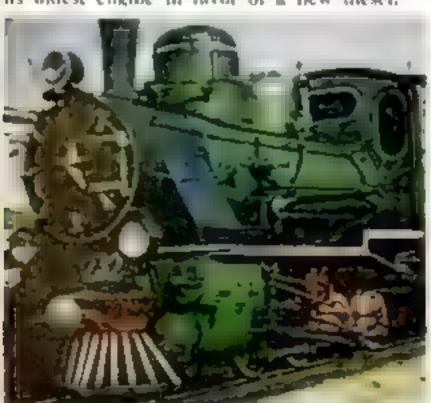
a state-owned cow, who sues whom? Or does the driver pay? Other roadblocks are slow wagons, unhurried flocks of geese and direks



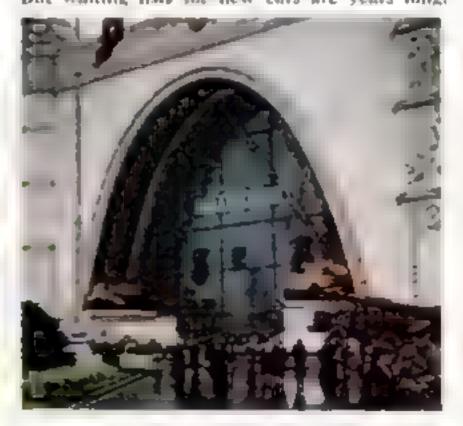
colorful goads in New Zaporozhe pietures production goads in the Ukraine under

the sixth five-year plan. Goods-hungry Soviet citizens feel they have a stake in statistics.

toy, but a 30-meh-gauge coal-burning steam locomplier. The kids' line at Kharkov is junking its oldest engine in favor of a new diesel.



impressive entrance to Industrial Exhibit is matched by displays of grant machine tools, tractors, trucks, ears and motorbikes inside. But waiting lists for new ears are years long.



96 POPULAR SC ENCE



SEWER FOR SIMPEROPOL. A dragling shovel helps excavitte for pipe. Co-eds digging elsewhere

on this street asked why we didn't 'shoot" the machine distead of them. So we did, here it is:

MOSCOW CROSSWALK. Traffic, squeezed right by posts that protect woman painting STOP on

the pavement, waits for light at Gorki Street. Area at lower right is mid-street safety strip.





SUNLIGHT ON THE KREMLIN, and shadow on a Moscow street. Autos may be few, but walks are always crowded.



MAIN POST OFFICE in Moscow announces International Letter Week, urges Ivan to write his friends and relatives.

RED SQUARE with St. Basil's (left) and one of five starred Kremlin towers. At right is the Stalm-Lenin tomb.







wagon, while one worried small boy and a curious blonde girl inspect the photographer.



A soldier eyes the aftomobile Americanski. In this crowd at Kharkov, there's a station wagon

of plodding cows with no intention of yielding the right of way, trains of geese in stately single file, and both bikes and pedestrians wandering about unpredictably require a sharp eye on the road.

Then there are the flax threshers. I don't know what it's like to hit a foothigh layer of flax stalks at speed, because by luck we always slowed down in time. The women who sat by the road would wave us on over the stuff. After enough wheels have crunched it, the women pick the stalks out and make piles of the seed, which stays right there on the road until a truck comes along to pick it up. You aren't supposed to run over the seed—or hit the platform scale on the highway.

Road repairs are equally casual. Sometimes we encountered-hidden around curves, with neither sign nor flagmen to give warning—braking crises in the form of machines, gravel piles and work crews. The crews are predominantly female. Men drive tractors, dozers and rollers; the pick-and-shovel jobs are women's work. We even saw a railroad section gang of women. "Here," our guide explained, "they have equality."

Most motor traffic consists of olivedrab trucks with license numbers stenciled high on the tailgate. Some roll at 50 m.p.h., but many are slower. At crossroads, a driver who pulls to the middle of the road may (1) intend to swing wide into a right turn, (2) mean to turn left.

or (3) simply like lots of room,

Russian drivers, of cars as well as trucks, are conscientious, actually, about signaling left turns on the highway. This they do by opening the left-hand door wide. Some even stick their heads out.

Our guide was apprehensive about overtaking trucks without warning. "Honk him! Honk him!" he would say tensely Since outside mirrors apparently haven't yet been invented in the Soviet Union, this was good advice.

About overtaking America: There is no brand-name advertising on Russian roads—but there are billboards. The big posters and signs admonish the passerby to "Overtake America" or to "Work for World Peace." Others are exhortations to work harder, produce more, stop hav-

ing accidents

Directional road signs are big, clear and plentiful. Many include destination arrows that warn of turn-offs and show where they lead. Occasionally there is a big signboard strip map along the road (free gas-station maps are unheard of). Every kilometer along the main Russian highways is marked by a neat post with two mileage plates on it. One side shows the distance from Moscow, the other the distance from the provincial city at the far end. Concrete guard posts, drainage ditches, guard rails and warning signs are substantial and well kept.

Shy tourists should stay home, for any foreigner in the USSR is conspicuous, and one in a foreign car triply so. Our station wagon galvanized Russians into attention everywhere. Women stooping at work in the fields would straighten up to stare. School children plodding home at dusk from double sessions cried out in amazement. Whenever we pulled up on the road, people appeared from nowhere.

They all wanted to know the same things: what make the car was, how many cylinders the engine had, its horse-



(note open hood). At right, O'Connor reads children's names written in dust on the Rambler.

power, and the gas mileage we got. Heavily loaded and cruising at 60 m.p.h., we were getting 9½ kilometers to the liter, a figure that greatly impressed our hearers. (Ours was obviously a bigger car than their Pobeda, which takes more gas.)

The price of the car, which Russians asked shamelessly and we told them gladly, impressed them as a great bargain. The Russian Volga, a much smaller car, costs 30,000 rubles—a whopping \$7,500 at the official non-tourist rate of exchange, or three times the average worker's annual pay. Our Rambler delivered in Belgium at \$2,600.

Between Smolensk and Moscow, traffic thickened, and I was surprised by the number of prewar American cars in sight —until a closer look revealed the ZIS or ZIM on the hubcaps. (The ZIM is a copy of an old Buick, the ZIS of a Packard)

In rush hours, Moscow traffic flows at quite an alarming pace on the city's broad boulevards (I clocked taxis at 55 m.p.h.). Driving is a battle of wits between motorists and pedestrians, who pay no heed to lights. Since horns are prohibited, a driver's chief weapon is outbluffing the crowds. He who hesitates behind the wheel is lost—in a maelstrom of foot traffic.

Drivers are far more rigidly controlled than pedestrians. On many major intersections you can't turn left (an arrow pointing straight up means no turn at all; if it has a branch, you can go straight, or turn as indicated only). Where no left is permitted, you turn right and then make a U-turn in a designated gap through the midstreet safety zone. This works fine.

A sign with a red bull's-eye and an

arrow pointing right means you wait to turn right on red. Some intersections have a row of four instead of three lenses in their traffic lights. The idea (and you'd better get it) is to wait for two greens to turn left.

It was time for a car wash when we reached Moscow. At the garage, two earnest, motherly little women in rubber boots and aprons took the Rambler in hand with spray hose and washcloths. Far too short to reach over the top, they flung the cloths up onto it and drew them down. When they were finished the car sparkled inside and out.

Russian mechanics, interested and helpful, made a new gasket for our leaky



SKOLKAT How many? The better, 74-octane gas was available only at a few special pumps.

FERRUARY 1958 [0]

jerry-can spout. But when I asked for an antifreeze hydrometer, they could only shrug their shoulders—and taste the stuff in the radiator instead. Savoring the coolant, they said it hadn't much antifreeze.

Every truck in the USSR seemed on its way south when we took off on the long haul for Yalta. To cover the long distances we drove after dark. Rolling country made night driving tricky; just over the crest of a hill often lurked a lightless wagon. Truck breakdowns seemed to call for conferences and repairs well out on the road, without flare or lantern to serve warning. But worst of all was the problem of dimming our own headlights. Even on low beam, they invariably provoked an angry blinking of lights from oncoming traffic. Finally it

dawned upon us that on approaching another vehicle we were not supposed to lower the beams, but to turn the headlights off entirely, driving by moonlight—if any. This may work with slow trucks; it puts a fast car in serious danger of hitting an unlighted obstacle.

Everywhere is the alert militiaman—not only at crossroads and in hamlets, but also standing on many a lonely country hilltop. Sometimes he has a motorcycle sidecar, complete with burp gun. The militiaman is cop, judge, court clerk all in one, for in the USSR, traffic court is held right on the road. Drivers who violate a traffic law pay their fine on the spot. The officer gives the offender a receipt and punches his driving license

The third night of our trip south we

How Communism Threatens Russian Science

Condensed from "A Report on Science in Russia Today" by Dr. Tom Margerison, scientific editor of the British magazine The New Scientist, who visited Russia about the same time as Popular Science's Harry Walton.

NOBODY who visited Russia without prior knowledge of her prominent position in science would dream that a country in which petty officialdom and inefficiency are still so evident could beat the world in the launching of earth satellites. Scientists are now probably the most pampered profession in Russia. They receive salaries as high as, or higher than, leading artists of the stage and screen.

The result is that there is great competition to join their ranks. The universities are inundated with atudents wanting to study science subjects. The prizes of an assured position, a salary sufficient to buy a car, and other comforts, spur the students to hard work.

One rather sinister fact about the education of Russian scientists is that at every stage in their career they are required to prove their competence in the Marxist-Leninist doctrine. Entrance to a university is reserved only for those who can pass their political examination. Entrance on a postgraduate course depends on the results of jet another political examination.

Trying to arrange a visit to a laboratory or research institute involves a series of tussies with officialdom. Inside, I might have been in any British university laboratory—but for the red banners, carrying Communist Party slogans in cerebration of the fortieth anniversary of the revolution, plastered bizarrely across the walls.

Busic research in the Soviet Union is carried out mainly in the laboratories and research institutes of the Academy of Sciences. and of the 13 provincial academies. The budget for each institute seems to be flexible and, provided the Academy agrees, there is little difficulty in obtaining additional money for special projects.

The Academy thus wields very great power. Recently, it has been stressing the unity of the Party and the scientists, and has, apparently, been attempting to increase political activity among the scientists.

A. Topchiyev, the secretary of the Academy, said recently in an article in Kommunist; "To fight idealistic views and trends, tirelessly to expose idealistic conceptions, is the duty not only of representatives of the social scientists but also of scientists working in all spheres. We must energetically rebuff all revisionists of the Marxist-Leninist teaching..."

If this nonsense, written by one of the most influential men in the Academy, is to be taken seriously, it means that the future of Soviet science is less bright than most people believe. It means that the Communist Party is trying to set foot in the laboratories and gain control of them in the same way that it has been doing in the armed forces.

Science cannot be conducted in this way, and I am sure that the majority of the Russian scientists realize it.

Three things have brought Soviet science to its present thriving state. First, the government is prepared to spend money on it. Secondly, it gives scientists the privilege of a higher standard of living and greater freedom of movement than most other people. Thirdly, the scientific secretaries and administrators form a barricade inside which scientific thought flourishes without concern for the party line.

It looks as though this barricade may soon be swamped. If things go on in this way we may yet see a marked decline in the standard of Russian science.



Moseow's Manezh Square on a rainy day, Historical Museum and (top right) part of Kremlin,
FERRJARY 958 103

stopped at what Salin, our guide, said was a resort hotel. (O'Connor, surveying the plumbing, dubbed it the Last Resort.) Zeleny Gai is a stop for the big through buses, diesels, that roll from Moscow to Simferopol with two relief drivers and loads of sober-faced Russian vacationists aboard. The hotel, only six years old, was already shedding plaster, and the plumbing was deplorable.

The road runs arrow-straight for miles south of Zeleny Gai. Looking at the roll-



CAR WASH IN KHARKOV: This Intourist chauffeur hosed down the Rambler in the hotel yard.

ing wheat lands, you could imagine yourself in the American Dakotas, until you ran across a knot of long-skirted, quiltcoated farm workers waiting for a bus or holding out a hand, palm up—a startling gesture that turned out to be the Soviet version of the hitch-hiker's thumb.

Gas is where you find it in the USSR. And not just any gas station will do. Most dispense a low-octane juice as full of pings as borsch is of cabbage. We had to use it just once, and to the Rambler's eternal credit it swallowed the stuff, protesting mildly.

The "high-test" gas is 74 octane, available only from certain pumps in specific stations—and possibly only to tourists. On this the car ran fine; for we had asked the Brussels assembly plant to detune the engine to take it.

For those occasions when the special pump wasn't working or the tank was empty of 74-octane, we carried 20-liter jerry cans. They came in handy a couple of times, making it possible for us to go on rather than accept the liquid horrors that satisfy Russian engines.

Gas pumps (which, for some reason, you aren't supposed to photograph) are ancient, dirty, usually hand-operated. Some were made in Germany, possibly before World War I. As the operator works a pump lever, gas flows into one of two glass flasks, while the previously filled one drains its measured volume into the car.

From Simperopol to Yalta is only 100 kilometers, but the road climbs two mountain ranges and anakes through a valley between them. The highway narrows down, with some widening at curves, but shoulders drop off into gulleys and driving is a matter of sawing the wheel continuously, with hardly 300 feet of straight stretch anywhere.

What had been drizzle turned into rain as we began to climb. Clouds wreathing the peaks had descended as fog, so that we reached the city, a maze of narrow one-way streets, late, tired and irritable.

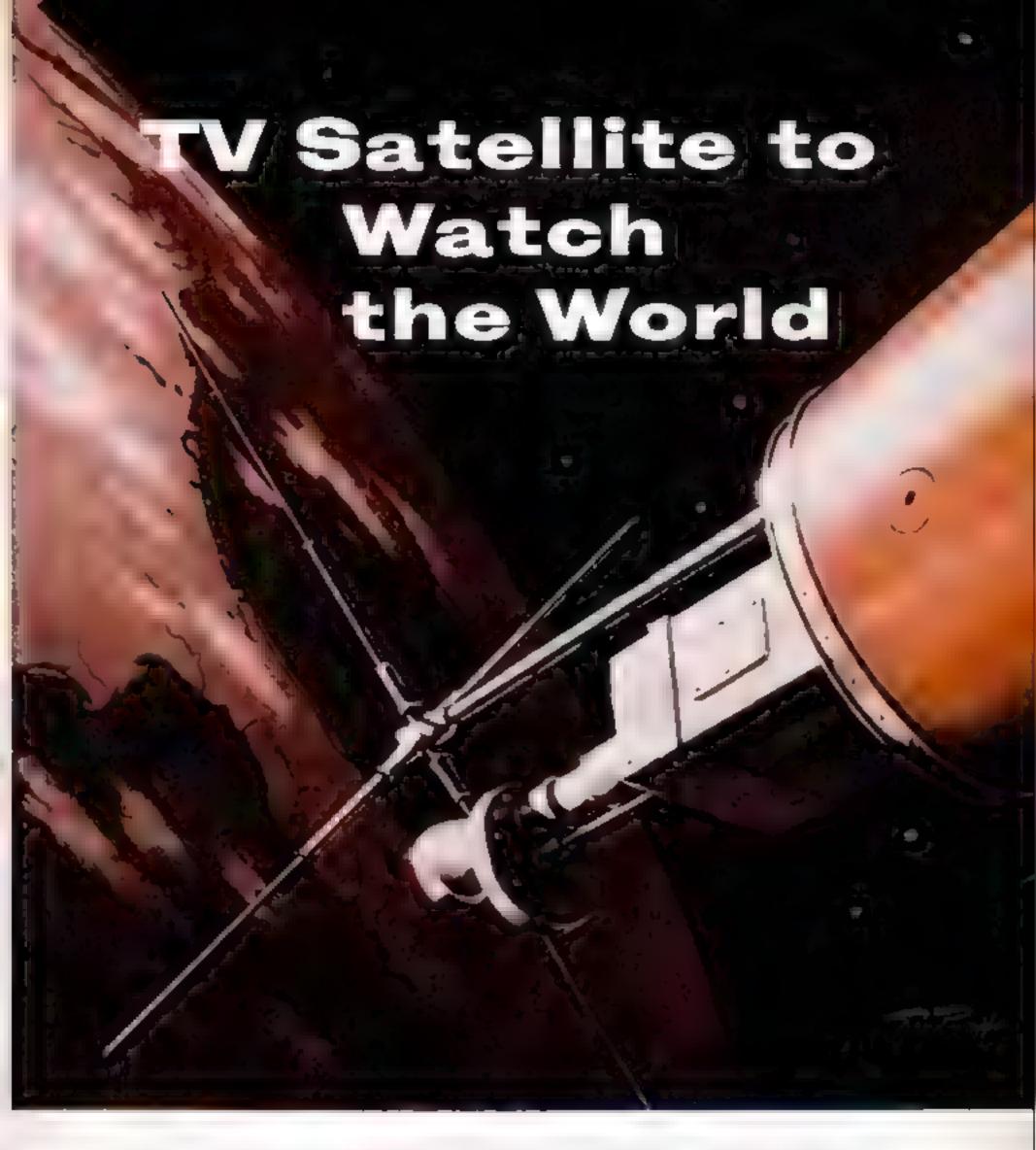
By daylight the mountain drive back north was easier and the scenery magnificent. In Simferopol a huge ditch down the main street was being filled in by some 30 good-looking girls, rather awkwardly wielding picks and shovels. When I produced a camera, they glowered and turned away. They were college students, giving a day's labor to the state. Perhaps they were unwilling to have a foreigner photograph what they thought might be construed unfavorably—or, more likely, plain female vanity was at work.

Farther north, we ran across evidences of private enterprise: women and children selling melons along the highway. As we passed a road-repair crew, a young woman bellowed enthusiastically at us. I asked what she had said. O'Connor translated: "What a car!"

To Russian officials, the Rambler was evidently a source of embarrassment. We were repeatedly asked to park it out of sight behind locked gates. In Kursk, a militiaman appealed to a large crowd: "Comrades, don't just stand here looking at this car. You have work to do. And you children should be going to school. Move on." Nobody budged —it was the militiaman who rather sadly moved on.

Outside a tiny village north of Zapo-

[Continued on page 234]



U. S. scientists tackle the immense problems of launching a globe-girdling, "seeing-eye" satellite. Target date: any time

By Wesley S. Griswold

IN THE wake of Russia's Sputniks and our own Vanguard procession of space travelers, the U. S. is planning to shoot an electronic eye into the sky This reconnaissance satellite, girdling the

globe every hour and a half at a height of 500 miles, will be equipped to take pictures of the whole world.

The seeing eye satellite, designed to acquaint us with many activities to which we are now largely blind, is officially called Pied Piper, Unofficially, and much more aptly, it is called Big Brother. That

was the name of an all-seeing, all hearing world dictator in George Orwell's pro-

phetic and chilling novel 1984.

The secrecy shrouding details of Big Brother is as hard to penetrate as that which hides the goings-on in the Kremlin. It has been reliably reported, however, that Lockheed Aircraft Corp. has been assigned to build the satellite and the multiple-stage rocket vehicle to transport it, that CBS and Eastman Kodak have been given the task of enabling it to see, and that Rocketdyne, a division of North American Aviation, and Aerojet-General Corp. will provide the mighty engines to boost it into its orbit.

When may we expect Big Brother to start giving us passing glances from 500 miles above? According to Air Force insiders: any time. Since the Russians are known to be at work on a similar project, Big Brother's debut will be speeded up.

1

What are some of the problems that must be solved before we can launch a reconnaissance satellite? What will it see?

I sought the answers from many working scientists, not all of them willing to be publicly identified. Here are the questions I asked and the answers I got:

Do we have rocket engines powerful enough to lift Big Brother into place?

That depends on how much it will weigh, and nobody close to Big Brother is giving out any figures. However, there have been educated guesses that a satellite weighing around 100 pounds could carry a small TV camera, miniaturized transmitter and their source of power.

Do we have racket engines capable of heaving a 100-pound satellite into an orbit?

Indeed we do. A quick way of estimating the capacity of the engine needed to do the job is to apply this rough rule-of-thumb: For each pound of satellite, you need 500 to 1,000 pounds of thrust. Even the original German V-2 developed 56,000 pounds of thrust.

"We now have rocket engines with many times the thrust of the V-2," said Paul R. Vogt, assistant chief engineer of Rocketdyne, which builds engines for the Atlas, Jupiter, Thor and Redstone missiles. "And there is no basic limit to the size of rocket engine that can be built."

We could have fired a rocket to the moon before now if we had had a good reason to do so. Maj. Gen. Bernard A. Shriever, head of the U.S. intercontinental-ballistic-missile program, has said that Atlas' power was sufficient to drive a payload of several thousand pounds beyond the pull of the earth's gravity. But sheer rocket power is not so important as the efficiency with which it is used in a particular vehicle.

Can we build a useful reconnaissance satellite that will be light enough to be

put in an orbit?

"It would take a marvel of miniaturization," said John A. Burrell, manager of technical operations for NBC's Western Division. "It's conceivable, of course, that with the use of transistors you could make a very light camera and a synchronizing generator that would weigh only

10 or 12 pounds.

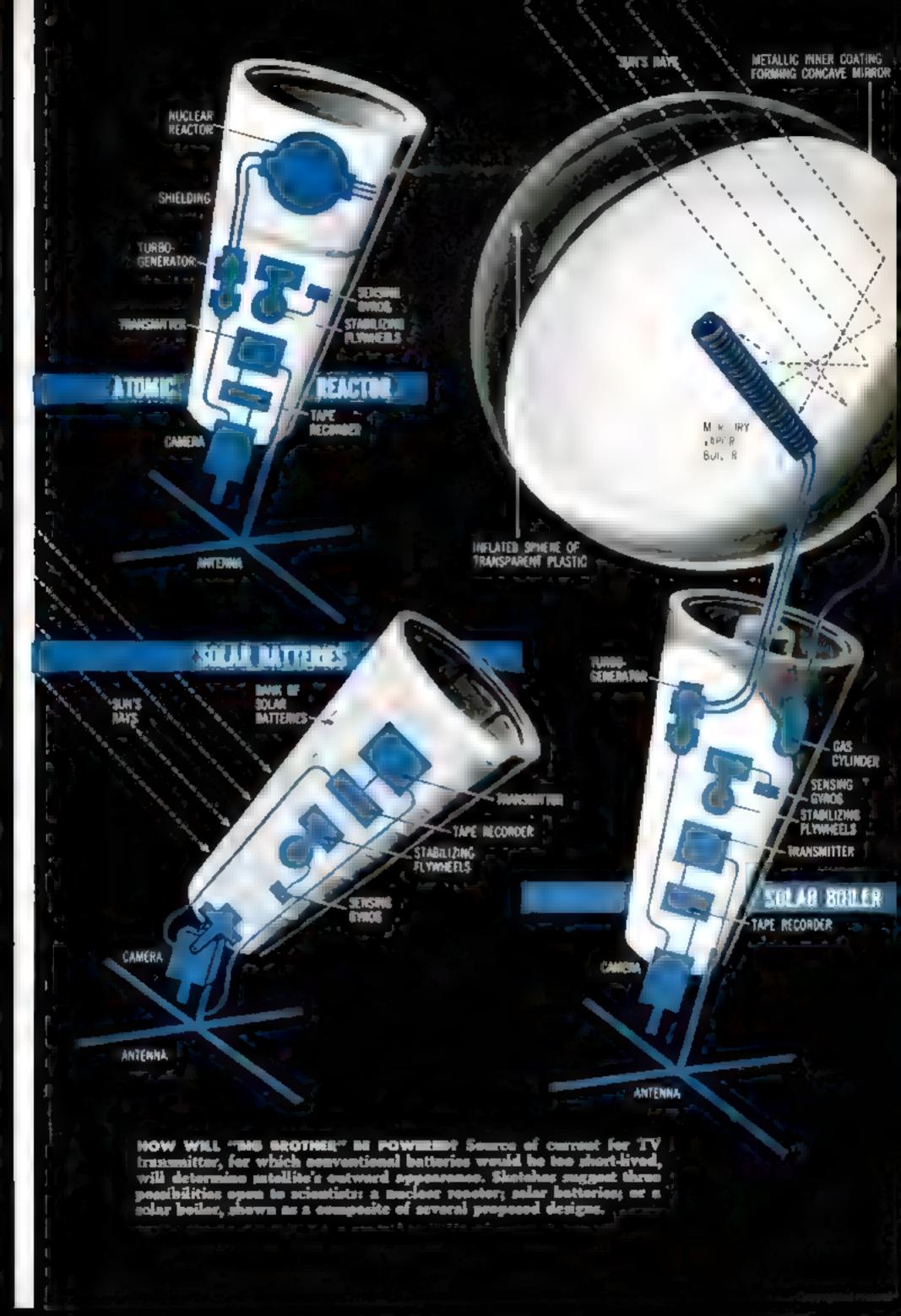
"What about optics? The wider the angle of lens, the smaller and lighter the lens will be. But the broader the view, the less detail you'll get in your picture. Assuming that we'd want to magnify what the TV camera sees, we'd have to use heavier, longer lenses. There would have to be some means of stabilizing the camera in space, and servo-operated equipment, remotely controlled, to swing it, keep it trained on the earth and adjust its focus. That would greatly increase the satellite's load.

"The real bind, though," Mr. Burrell said, "would come in trying to get a microwave transmitter small enough and yet powerful enough. The smallest suitable transmitter I know of weighs at least 1,500 pounds. Even assuming some genius could miniaturize this to 150 pounds, you'd need 1,500 to 2,000 watts of power to send a good video signal back to the earth from a height of 500 miles,"

This estimate of the needed power—a figure all-important to choice of power source, and hence to the whole design—is much higher than some. For instance, as little as 100 watts was recently suggested as sufficient for a TV space vehicle by Prof. S. F. Singer, University of Maryland physicist.

What kind of orbit would a reconnaissance satellite have?

If it is to see all of the earth at one time or another, and not just part of it, its carrier rocket will have to be launched at right angles to the equator. Thus the rocket will need more power and be harder to aim than Vanguard's rocket, which,



"It could watch and direct a guided missile unerringly from the launcher to a target

launched eastward from Florida, gets a 900-m.p.h. boost from the earth, traveling in roughly the same direction.

What will Big Brother be able to see? "Once the reconnaissance satellite is on the wing," says Dr. Heinz Haber, noted physicist and space scientist, "meteorologists will be able to watch cloud formations and the origin of major storms. Cold and warm fronts, squall lines, thunderstorms, hurricanes and tornadoes can be followed up and their courses predicted.

"We are still pretty much in the dark as to how the huge weather machine works," he continued. "The glassy eye of a TV camera in space can soon tell us how to save countless lives and dollars that violent, unexpected changes in the weather now wipe out."

Will the seeing satellite be able to detect objects smaller than countries and vast cloud formations?

It should be able to see ships and planes, detect forest fires and watch the wanderings of icebergs, Dr. Haber believes. His thoughts are entirely of its peaceful, beneficial applications. He sees it especially as a marvelous aid to transoceanic traffic control, both on the surface and in the air.

But won't it have great military value, too?

Some scientists think so. And military men think of the satellite primarily as a means of taking frequent looks at a potential enemy's territory-200,000 square miles at a glance. They believe it will be able to spot troop and fleet movements almost as soon as they start. They believe it could watch and direct a guided missile unerringly from the launcher to a target thousands of miles away. They are confident that it will detect atomic tests, the construction of airfields and big industrial plants. It will be an invaluable means of remapping the world, with greater accuracy than has ever been possible before. It will pinpoint the locations of bases whose whereabouts are not known precisely now. Even if cloud cover or darkness should hide these vital installations during a few of Big Brother's flybys, they will be caught in full sunlight sooner or later.

How could we power a TV transmitter in outer space?

The most obvious source is the sun. But solar batteries at their present stage of development are weak. They could supply a very modest amount of power, which might be adequate if a TV transmitter could be operated on as little as 100 watts. But if it called for the higher estimate of 1,500-2,000 watts, the required number of solar batteries would be of prohibitive bulk and weight.

Dr. Wernher von Braun, renowned authority on rockets and the problems of space travel, suggests a solar boiler. He proposes a system of concave mirrors with little mercury-filled pipes attached to them. The mirrors would catch the sun's rays and the mercury would carry off the intense heat to run electrical generators. These, he estimates, would develop 12 kilowatts of power, a generous supply for a reconnaissance satellite. Whether such a design could be kept within a reasonable weight limit is problematic.

Could we use nuclear power to run the satellite's transmitter?

It seems difficult; though a reactor only a foot in diameter, containing four gallons of fissionable material, has been built. Even the tiniest practical reactor would have to be teamed with a heat exchanger and a generator in order to produce electricity. This would be a heavy combination for the satellite, even if shielding were left off the reactor. Another problem: Radiation from an unshielded reactor might injure the satellite's TV equipment even though, at a height of 500 miles, it would be no threat to humanity.

What will Big Brother look like? It will probably be the final stage or

nose cone of the carrier rocket. Its TV eye might be set in the tip of its nose. The iens can be protected during ascent by a ceramic cap, to be blown off by a small explosive charge when Big Brother arrives in its orbit. Or it might prove desirable to have the lens in the middle. Small flywheels, von Braun suggested,

thousands of miles away"

could keep its eye fixed on the earth, Would Big Brother have a radar scanner?

At that height, no present-day radar could provide meaningful pictures.

How are we going to receive television pictures that the satellite has taken on

the opposite side of the world?

They will be automatically stored on magnetic tape—already used to record TV programs. Then, when Big Brother swings into sight and range of our recieving antennas, a radioed command will start the tapes transmitting what the camera saw half a world away.

Would it be possible to jam telecasts

from the satellite?

Yes. It is far easier to track down and interfere electronically with TV transmitters than with radio transmitters.

Will it be feasible to use film-carrying

cameras on Big Brother?

So far as the actual picture-taking is concerned, yes. It would not be much harder to take unblurred shots of the earth from a vehicle traveling 18,000 m.p.h. at a distance of 500 miles than it is to take them from a jet plane flashing over the landscape at treetop height. Sharp, detailed photos have often been obtained from low-flying planes moving several hundred miles an hour.

The acute problem would be that of retrieving the exposed film. If it can be detached and sent down (i.e., slowed and put in a "decaying orbit") without being incinerated by the friction of its fall to earth, there still remains the job of finding it when it lands. After that comes the puzzle of how to load fresh film up there.

Could Big Brother take infrared pic-

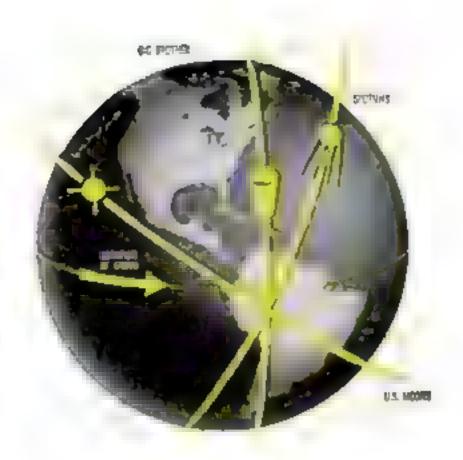
tures at night?

Not now, and not from that height. Infrared photography hasn't yet been made effective enough.

Wouldn't tiny meteorites pit and cloud

the lens of a satellite's camera?

Probably, though it might take quite a while for them to interfere seriously. Besides, there is a relatively simple way out of this difficulty. Dr. Haber suggests making use of a camera with rotatable



POLAR ORBIT of "Big Brother" satellite, contrasted with less-far-ranging orbits of Russia's Sputniks and of U. S. Vanguard "moons," will let it view entire surface of earth.

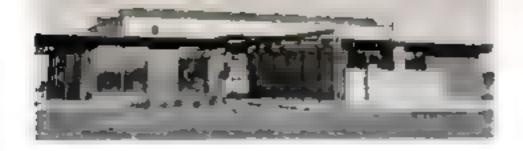
lenses and with a photocell to warn when a lens is becoming even slightly obscured. The photocell could then trigger a mechanism to rotate a new lens into place.

What will a reconnaissance satellite mean in international relations?

Obviously no nation will stand for this kind of snooping unless it has the right to reciprocate—or unless it doesn't know.

A reconnaissance satellite might be painted dead black and launched secretly, without radio beeps to give itself away and with its orbit known only to its launcher. It might conceivably take its pictures in secret for a long time. But once it was discovered and its orbit plotted, it could quickly be put out of commission—not by an atomic bomb but by buckshot!

The indignant nation that found it out need only prime a rocket with a big load of lead or steel pellets and a small explosive charge and launch it into the same orbit with the satellite, but headed in the opposite direction. This could be done on the opposite side of the world, with the charge set to explode a quarter-turn away from its target. Thenceforth, on each successive wheel around the earth, snooper and shot would collide at an impact velocity of around 36,000 m.p.h. It wouldn't be long before the satellite was reduced to a cloud of metal shreds, circling the earth aimlessly.



Will Your Next House

Here's a man who keeps his house warm with a factory-built solar-heat system that forecasts fuel savings of 80 percent



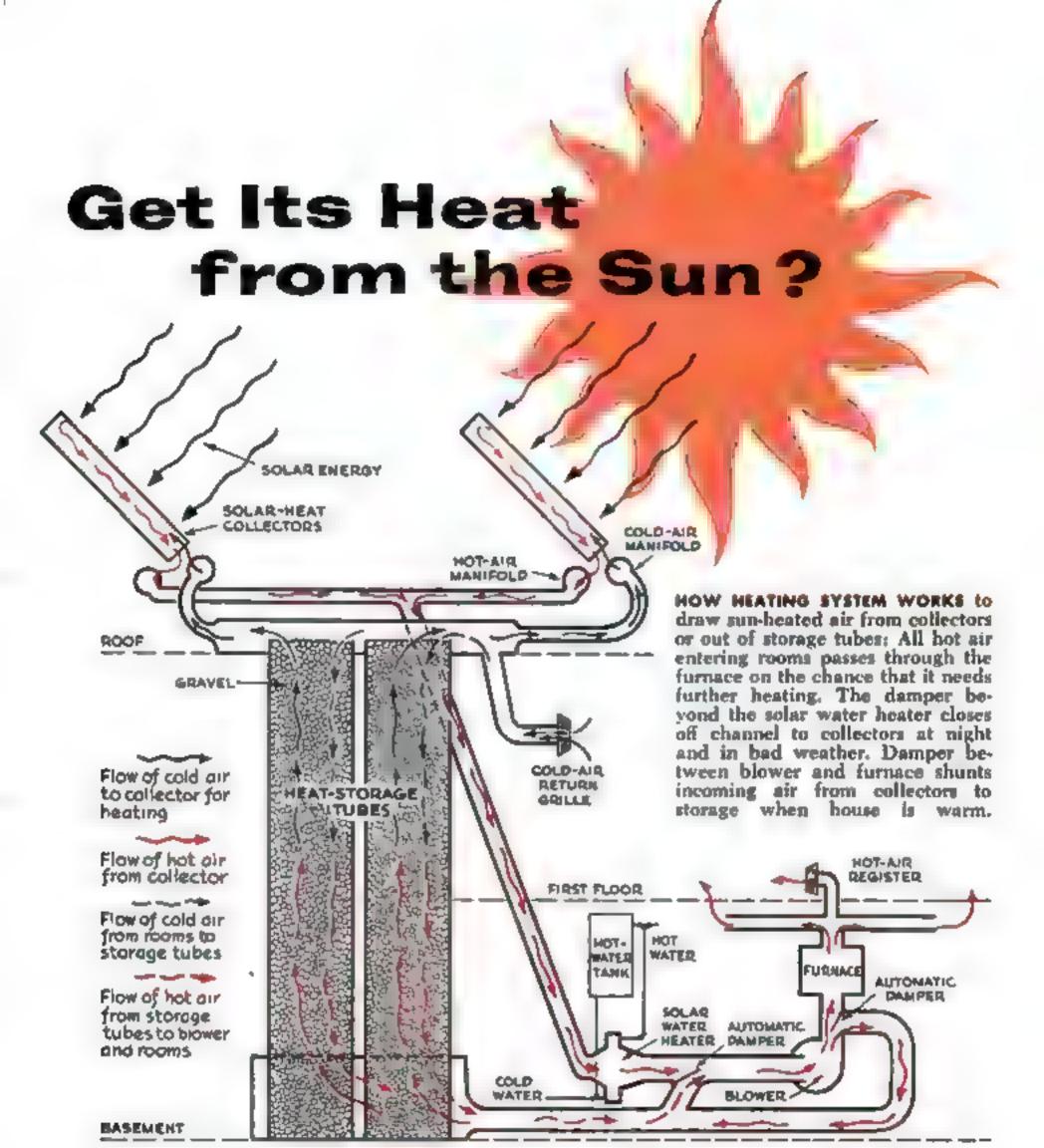
NE clear, cold day early this winter, I walked into a cozily warm nine-room house in Denver and learned an amazing fact. At that very moment, the heat so comfortably abundant in the big new contemporary home was costing the owner of the place absolutely nothing. The sun, pouring unlimited energy upon eastern Colorado, was providing every last calorie of it.

A few minutes later, it did even more.

NE clear, cold day early this winter, I walked into a cozily warm beat, to be stored for use that night.

I heard it happen. I was standing beside the conventional-looking furnace, in a basement area not noticeably different from any other modern utility room. Suddenly a switch clicked, a damper closed with a metallic exclamation, and the electric blower in the hot-air heating system began to work twice as hard.

My host, Dr. George O. G. Löf, a con-



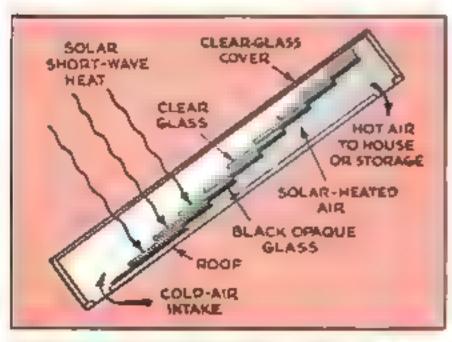
sulting engineer, turned to me with a pleased look. "The house has got all the heat it wants right now," he explained. "Since the thermostats aren't calling for more, the sun-heated air from the collectors on the roof is automatically being shunted into storage."

Dr. Löf, a tall, lean, red-haired man of 43 who is a solar-energy expert of international reputation, had a right to look pleased. He had designed the novel and efficient heating system. American Window Glass Co., of Pittsburgh, for whom Dr. Lof is a research consultant, built it.

The Löf home—a lively household of two adults, four energetic youngsters and a black cocker spaniel—is not, of course, the first in the U.S. to be heated by the sun. There have been at least half a dozen others—all odd looking, because they were primarily outsize collectors of solar energy



SURPLUS SOLAR HEAT is stored in these two 16foot, house-high tubes. They are filled with 10 tons of coarse gravel. Rooftop view (top) shows how air ducts and storage tubes connect.



OVERLAPPING GLASS PLATES within collector panels trap sun's heat. Solar "furnaces" on roof are 50-foot aluminum frames holding 20 panels, each measuring six feet high, 2½ feet wide.

with living quarters attached to them.

But the attractive residence of the large and happy Löf family is unique in two respects: (1) It is the first American house to have a solar-heating unit as optional equipment that didn't dictate and distort the design of the house to suit its needs. (2) Its solar-heating unit was the first to be factory-made.

Thus the Löf home may very well make housing history. It represents a decisive step away from the laboratory toward the day, perhaps five to 10 years from now, when solar-heating will be the most practical kind for thousands of homes.

If your eyes weren't searching the rooftops, as mine did, for signs of solar-heat collectors, I don't think you would very quickly single out the Lof's \$40,000 house from among its comparably expensive neighbors in Cherry Hills Village, a suburb southeast of Denver.

That large, low, square enclosure on the roof, seen from a distance, might easily be mistaken for a sun deck. Even at close quarters, the two long aluminum frames of glass panels that stretch across the roof enclosure, parallel and a few feet apart, aren't scene-stealers. They don't protrude very far above its rim, because they face the south at an angle of 45 degrees, to catch the maximum amount of energy from the low winter sun.

Each panel in the collectors contains several plates of specially treated, non-reflective glass, partially overlapping but with quarter-inch air spaces between them. As the radiant energy of the sunlight strikes these glass plates, heat is trapped between them. Panel temperature, even in winter, may rise to 250 degrees F.

Then cool air from the house, pushed up there through ducts by the blower in the basement, enters the collectors and is blown through the narrow passageways between the plates of glass. The moving air "wipes off" the heat and carries it either to the rooms below or into storage.

The collectors don't demand housekeeping attention. Snow slides off them of its own weight, and atmospheric durt, in the clean air of Denver, doesn't accumulate on them enough to lower the efficiency of the collectors' glass.

Inside the five-bedroom house, expansive in looks and spirit, bright with picture windows, there is only one evidence of the unique heating system.

In a broad, oak-paneled stairwell leading to the basement from just inside the main entrance stand two massive Chinesered tubes, 16 feet tall, three feet in diameter. They are majestic in simplicity and size. Behind the stair landing, they stretch from cellar to roof. These are the storage chambers for surplus solar heat. Though you wouldn't believe it until you touched one, they are made of fiberboard, and they are filled with thousands of small chunks of rock. This coarse gravet holds the heat as long as 24 hours.

It was the architect—James Hunter, of Boulder—who wisely suggested that the Löfs not try to disguise the storage chambers, but paint them a vivid red. It glows

warmly against the oak walls.

When the collectors on the roof are gathering more heat than the house needs at a particular time, the excess is forced into the storage chambers at the bottom. (The furnace blower speeds up to do this job in order to overcome the resistance of those columns of rock.) This naturally drives off any cold air at the top of the storage chambers, pushing it along into the collectors to be heated and then returned to the other end of the tubes.

At night or on cloudy days, the solar collectors are bypassed. Then, whenever the room thermostats signal for more warmth, the blower draws stored solar heat out of the storage tubes from the bottom. This warm air is blown through the furnace, where, if it is not hot enough to satisfy the thermostats, an auxiliary gas burner turns on automatically to heat it.

Beyond the easy task of learning to like the storage chambers, the Lofs have not had to make any concessions to their unique heating system. They have all the windows they wanted—a lot, for the house stands on rising ground with a 150-mile-wide view of the Rockies. There are 17 picture windows, 10 others of more normal size. All have double panes—a precaution any homeowner is likely to take in that climate.

The cold-air-return grilles and hot-air registers throughout the Löf house are conventional and unobtrusive.

The furnace room looks normal, but there are two water tanks. A small heat exchanger is connected to the larger (80gallon) tank. As hot air from the solar collectors is drawn down from the roof, it passes over water-filled coils in this exchanger, heating the domestic hot water, which enters the 80-gallon tank. Water warmed this way then flows on into a smaller (60-gallon) tank, equipped with an automatic gas heater. If the water by now is as hot as the thermostatic control demands, it is distributed to the house just as the sun warmed it. If it is not hot enough when it arrives in the smaller tank, the burner quickly brings it up to the required temperature.

Thus, in sunny weather the gas burners in the furnace and in the smaller water tank are called upon only if the solar-heated air and water need a few additional degrees of temperature. At night, during spells of fair weather, there is almost always solar heat in storage to draw on, even during a cold snap. During cloudy or stormy weather that persists more than a day, the house's standby gas furnace has to shoulder the burden.

It will never be practical to try to heat a house in a cold climate entirely by the sun, Dr. Lof says. To do so would require a solar-heating system so large that it would cost much more than the combination of solar and conventional heat that he is now using. In the Denver setup, the furnace and auxiliary fuel carry a modest fraction of the heating load.

How much does it cost to heat a house by this fuel teamwork? It is far too early to say, Dr. Lof told me. Both he and American Window Glass Co. say they must accumulate a lot more data and much longer experience with their system to make dependable estimates.

This first solar-heating unit cost much more than it would if it were being mass-produced. Ten years from now, Dr. Lof predicts, the price of the solar portion of a typical house's heating system may be

trimmed to \$1,000.

By the late 1960s, he says, the cost of fuel for heating a house by the method American Window Glass is now pioneering should be only one-fifth as much as the cost of heating by conventional methods in the same locality.

Dr. Löf intends to link an air-conditioning system to his solar-heating unit, using the sun much as gas is used to chill a refrigerator. When that happens, to change over from heating to cooling their house, the Lofs will merely throw a couple of switches.—Wesley S. Griswold.



Seated at Centralized Traffic Control board, Milwaukee Road train dispatcher Bill Kelly sets

The Robot That

Milwaukee Road's big brainbox puts 330 miles of high iron under the dispatcher's thumb

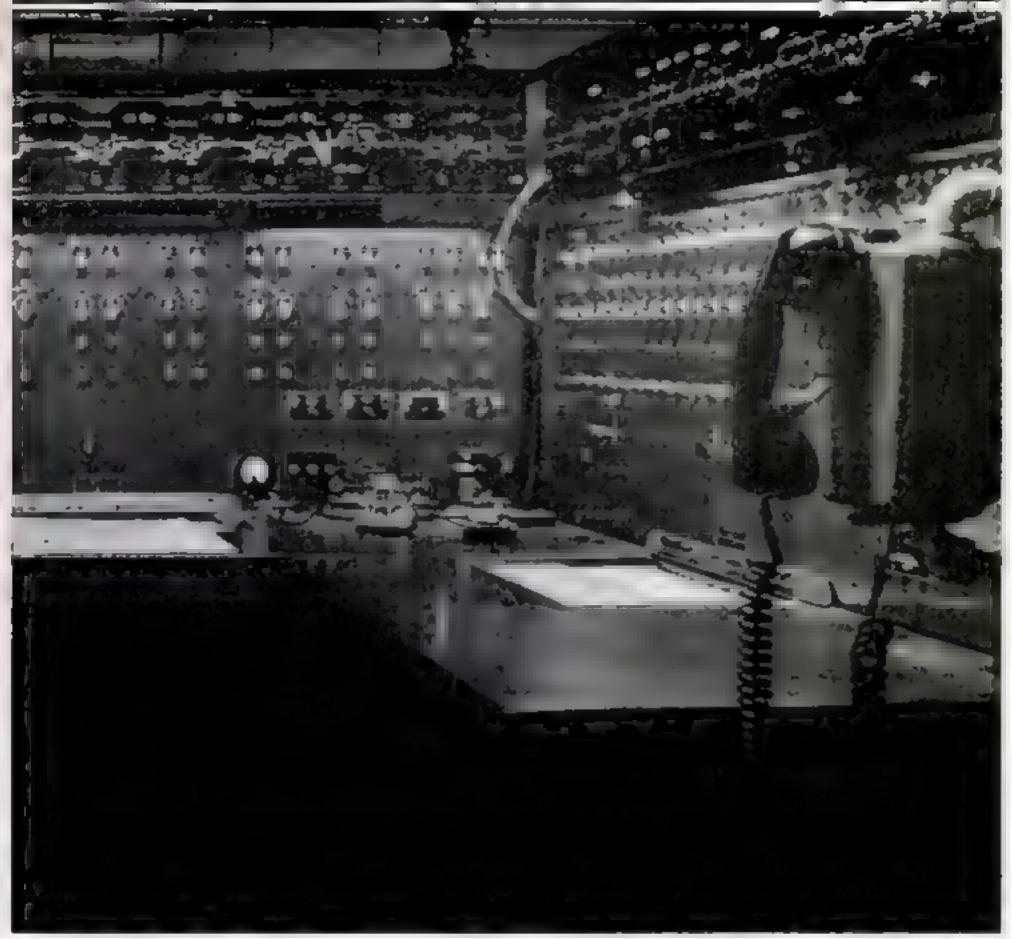
By Henry B. Comstock

IN THE little railroad town of Perry, Iowa, a train dispatcher nightly plays one of the world's hottest transportation symphonies. His keyboard is the largest Centralized Traffic Control machine ever designed for one-man operation.

Seated within reach of 269 miniature levers, toggles and buttons, this Milwau-

kee Road dispatcher can throw a massive track switch located 210 miles to the east, or change the color of a searchlight signal 120 miles to the west. The big machine shows him the location of every train on the high iron between Green Island, on the Mississippi River, and Council Bluffs, on the Missouri. It gives an emphatic ping each time one of these trains clears a switch, and flexes a robot hand to jot down the exact time with a fountain pen. It indicates which way the switches are lined up at turnouts, and what signals are being displayed. It brings in the voices of trainmen calling from trackside phones,

14 POPULAR SCIENCE



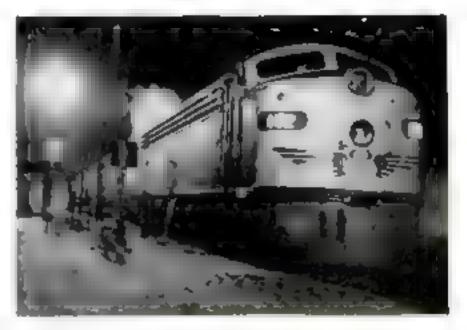
up signals and switches clear across the State of Iowa for 11 world-famous streamliners.

Runs a Railroad

of enginemen riding high in the cabs of streamliners and mile-long freights, even of the walkie-talkie-equipped signal maintainers who ceaselessly tend this fantastic machine.

We watched this CTC machine at Perry put on a late, late show recently with 11 of America's most famous "name" trains. Rain, one degree above sleet, was slashing at the station platform as PS photographer Bob Borst and I made a run for the dispatcher's office. "Nice weather for indoor shots," Bob shouted.

But Milwaukee Road's supervisor of signals and communications, R. R. Me-



"CITY OF SAN FRANCISCO" takes on water just outside the dispatcher's office in Perry.

"It's kind of like a piano with its keys so interlocked you couldn't possibly strike a sour chord with them"

Conahay, had other ideas. As soon as he had helped us stow our cameras and tape recorder in the chief dispatcher's office he

tossed us a couple of slickers.

"Before you have a look at the board," he said. "I want to drive you out to Herndon, 12 miles west of here, to see how close a dispatcher times his meets with CTC."

As we sizzled along the dark highway, McConahay filled us in on the Iowa

Division setup.

"Time was," he said, "when we had double track most of the way across the state. Now we're handling more traffic than ever with only one. CTC does the trick by giving a dispatcher a momentto-moment picture of what's happening out on the road, and making him his own switch tender. That way he can put trains around each other on sidings with splitsecond efficiency and a minimum of track.

"Pulling up one set of rails pays off three other wavs-reduced operating

"FIELD LOCATIONS" like this shed receive orders transmitted by the CTC machine and convert them into the electronic muscles that throw track switches and change signal indications.

costs, less track maintenance, and a nice cut in taxes because, once we remove a track, the roadway beneath it reverts to unimproved property. Add them all up and this is a good investment, even though it cost the Milwaukee around \$14,000 a mile."

McConahay turned off the main drag and headed west along the shoulder of the right-of-way. Two hundred yards ahead, a searchlight signal tossed two spears of red light over our heads and on toward Perry.

"Shows what the right reflectors and lenses can do for a couple of eight-volt bulbs," McConahay said as he stopped the car. "That board is set against Number 111—the 'City of Denver,' Beyond the signal, the two tracks beside us narrow down to one. You'll notice the signal across the way is showing red-over-green. That's for Number 20, our eastbound 'Arrow,' Red-over-green means the dispatcher is going to put her on Number 2 track. If the board showed green-over-red, the switch would be lined for Number 1."

"You mean trains don't always hold to

the right at turnouts?"

"Not with CTC. We run 'em whichever way suits us best. At Perry, for example, we put both east- and westbound passenger trains on Number 2 track whenever we can, because it's nearest the station."

"Could a dispatcher set up the switches

for a head-on collision?"

McConahay shook his head. "He could try, but the CTC machine wouldn't let him. It's kind of like a piano with its keys so interlocked you couldn't possibly strike a sour chord with them."

He pulled out his watch and turned its bold numerals to the map light under the dash, "10:13. Number 20 should be showing in about two minutes. She's due here at 10:20."

He was off by 10 seconds. At 10:14:50 Bob pointed to the west and said, "Here

comes Sputnik!"

A wobbly little blur of light had just tipped the horizon. It was a good three minutes before it broke in two and became a pair of locomotive headlightsthe top one steady, the one below it painting the rain with violent cross-strokes.



RAIL-RIDING PONTIAC used by division superintendent Jim Hayes is too light to operate block

signals. Dispatchers protect it with signals controlled from the CTC machine.

"Best crossing warning ever invented," McConshay said, "When we first started using those oscillating beams, folks slammed their cars in reverse and dug out fast. They figured our trains had jumped the tracks. Now, look behind you."

Away off to the east was another little Sputnik.

The CTC machine had done a nice job of orbiting. The "Arrow" crashed by us right on the advertised, a blur of barred mail-car windows, followed by the flicker of dimly lighted coaches and sleepers. A moment later the upper signal on the mast beside us winked from red to green.

"Dispatcher's just given the 'City of Denver' the single track," McConahay explained, "A light on his panel told him the instant Number 20 cleared the switch."

The "City" train was in a hurry. She bore down on us with her airhorn braying hoarsely for the crossing. At 10:23 she was only a puddle of rear-end lights and the wave of a flagman's lantern.

"Guess we could do with a cup of hot coffee about now," McConahay said. "But there's one thing more you should see before we head back to Perry."

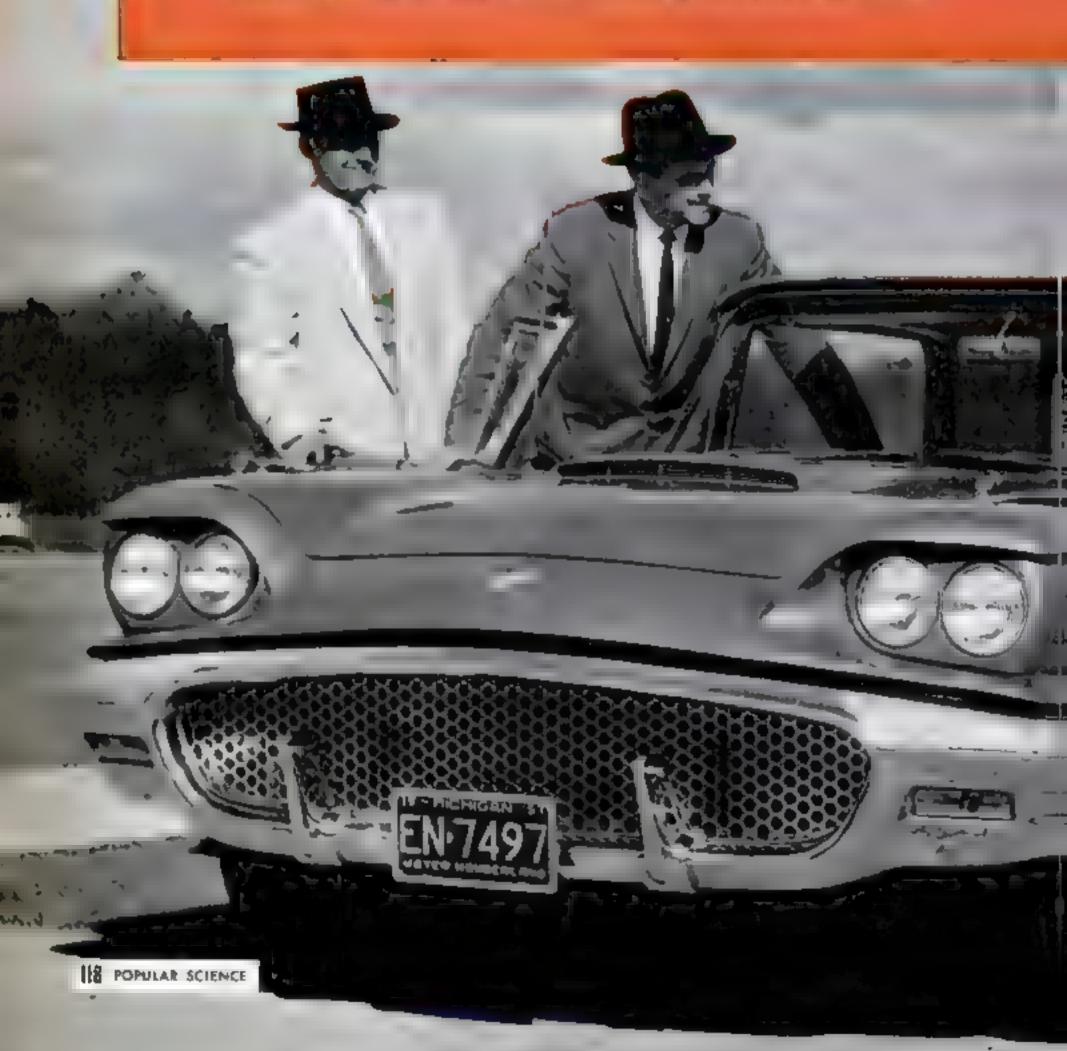
He wheeled the car around, returned to the crossing, then doubled down the other side of the right-of-way to the signal facing west. A few yards distant was a welded sheet-metal shed, with a phone box on a pole beside it. We climbed out of the car. McConahay unlocked the shed door with his switch key and snapped on the lights. Inside, the air was filled with the hum of trickle chargers keeping the soup up in a bank of wet-cell batteries. Above them, shelves loaded with relays lined the walls.

"We call this a 'controlled field location.' " McConahay said, "There are 60 others like it strung along the Iowa Division. In effect, they're the robot switchmen and telegraph operators of our CTC setup. When the master machine in Perry says, 'I want to throw the switch for Number 2 track at Herndon,' the order goes over our carrier wires in the form of a 16-unit signal—a combination of dots and dashes that every other field location on the line ignores. But three little relays in that glass-windowed box to your left give themselves a sudden nudge. 'Hey, boys,' they say, 'that's us!'

"So they snap closed, and this passes the word along to a succession of other interested relays. Between them, they close the circuit, and a 24-volt battery pours a shot of DC juice into the switch motor. It takes that motor exactly 14 seconds to move three tons of steel from one

[Continued on page 250]

T-Eird Now Tolies Four



By Devon Francis

AST month the Ford Motor Co, did something that is going to outrage a lot of people It junked its two-seater Thunderbird. At the same time, it did something that is going to delight a lot more people. It brought out a four-seater Thunderbird.

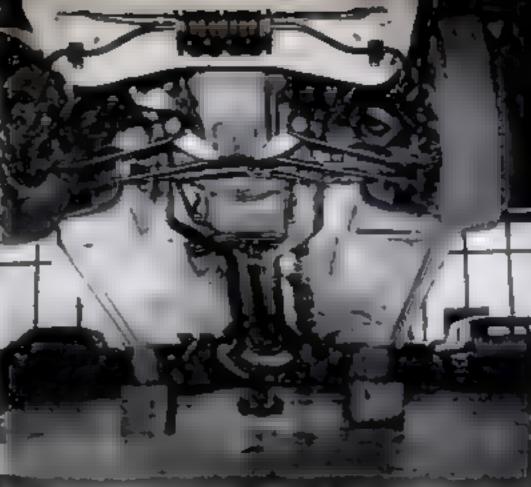
The new T-bird is a hardtop. It's longer, heavier and a lot roomier than its predecessor. It's powerfuller. It's built differently. In appearance, it's a sort of vest pocket Continental Mark II Fine so far







ENGINE OF 300 HORSES gives Thunderbird a weight-power ratio of 12.8 pounds-to-one. Third's 3,848 pounds may be trimmed.



UNITIZED BODY—like those used by Lincoln and American Motors—lowers floor, makes room for exhaust pipes in transmission tunnel.

but that isn't the real story of the new Bird. I'll tell you some things that even Ford insiders aren't saying out loud. But first, the vital statistics.

Overall length is 205.4 inches. That's about 3½ inches longer than a 1958 Ford Custom 300. Wheelbase is 113 inches. That's up from the two-seater's 102, but is several inches shorter than the wheelbase of a Chevy, Ford or Plymouth.

Width is 77 inches. That's an inch shy of the Ford's. Height is 52.5 inches—practically that of the old hardtop two-seater—but 4½ inches lower than a Ford Custom 300 or a standard Chevy. It's four inches lower than a standard Plymouth.

Yet the Bird's passenger headroom, front and back, comes—astonishingly—to within a fat inch of that in the Plymouth, roomiest of the Big Three. Nor is the ground clearance sacrificed. It's more than six inches. That compares with less than six in the Ford, 6.8 in the Chevy and 5.4 in the Plymouth.

Power? Each of the T-bird's horses has to tote 12.8 pounds of car.

For comparison: the heftiest Chevy, 12.3; Ford, 11.9; Plymouth, 11.1; Caddy Special, 16.4; Lincoln Premiere, 13.1.

This implies that the new T-bird is a pretty heavy car. It is, With that 300-horse engine, it weighs 3,848 pounds (compared with 3,622 for a Fairlane 500 two-door hardtop) standing empty at the curb. That's too much, and the Ford peo-

ple plan to do something about it. Well, there you are.

How did all this come about? To get at the whys and wherefores, you have to understand the way Ford tycoons work. With most other Detroit manufacturers, a car is designed and styled, and then (inevitably) the top brass begin talking it over at home. Presently a reigning vice president will come bustling into his office on a Monday morning and announce, "The seats have got to be an inch higher." That's not him talking, it's his frau. The seats are made an inch higher, too.

Nothing like that happens at Ford Motor. They do everything by market surveys. If a market survey should show that U. S. motorists want raceoon tails on their radio antennas, you can bet your bottom dollar that Ford would put a raceoon tail on every radio antenna. It's the way they think.

The first T-birds were marketed in the fall of 1954. By early spring, 1955, Ford had begun a market survey of the product. What did owners like about it? What didn't they like? Ford wasn't satisfied with the results of its own survey. It hired some outside people to do a survey of its survey. Before the frost was on the pumpkin, Ford had its answers:

T-bird owners were utterly batty about their cars, but they wanted:

- More entrance room.
 More luggage room.
- 3. Room for more passengers,



LUGGAGE COMPARTMENT, with centered spare, offers utilitarian hauling room—22 cubic feet worth (Ford Custom 300 has 28.9 cubic feet).

BETWEEN-SEATS CONSOLE atop the transmission hump contains heater controls, ash tray, radio speaker, switches for electric windows.

The Ford brass said to its stylists, "If you had \$100,000 to spend on a custom body, show us what you'd build." It said to its engineers, "Dream us up a four-passenger Bird." It said to the stylists, "And, oh yes, don't destroy the looks of the Bird." It said to the engineers, "And, oh yes, while you're at it, make the body and frame in one piece, and put in coil springs because we'll use air springs maybe, and be sure to leave room for air-conditioning."

So they did.

When the original two-seater Bird was introduced, Ford hadn't known how to characterize it. Lewis Crusoe, division general manager at the time, christened it a "personal car." The Bird wasn't designed as a sports car, and it wasn't one.

Nor, by any stretch of the imagination, is the new Bird. But the Ford people know what to call it now—and thereby hangs the story that I promised you. The car is simply a four-passenger, two-door pillarless sedan that was designed to be 52.5 inches high.

Nothing like it, in a production car, is made in this country. The "sportstype" cars styled by Chevy, Pontiac, Studebaker-Packard, Chrysler, Plymouth, Dodge and De Soto bear no resemblance to it. Chrysler toyed with the idea in its French-designed experimental Facel Vega three years ago. Cadillac had something related to it in its display LaSalle at the GM Motorama in 1955.

These cars and the new T-bird are not only a departure from current sedan design—in some respects they represent a reversal of it. For years, most cars have become ever-bigger, ever-bulgier, ever-gaudier. The Bird packages four persons, no more. It's sleek. Its ornamentation is almost severe. Boasted a Ford spokesman: "We put the styling in the contour of the metal itself, not in the trim." Only the horsepower bulges, and perhaps someone at Ford will be smart enough to reduce that to a palatable and economical size.

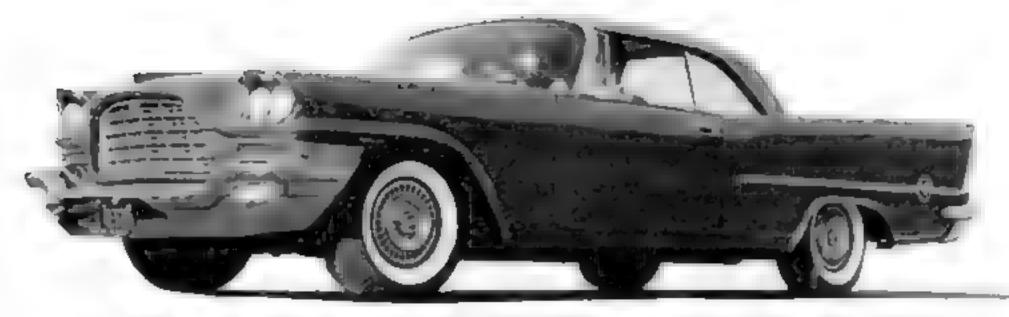
Production of the four-seater has not been without its problems. The huge hood, eight inches wider than a standard Ford's to accommodate that engine, tended to flutter at high speeds and had to be beefed up. The car was "over-designed," and considerable weight must still be scalpeled out of it. The big engine imposes so much weight on the front wheels that steering without a power assist is a sweaty wrestle.

But the new Thunderbird remains, like the Mark II that it somewhat resembles, a stylist's dream in elegant simplicity.

It's not likely that production facilities will permit many more than 25,000 T-birds to be turned out in 1958.

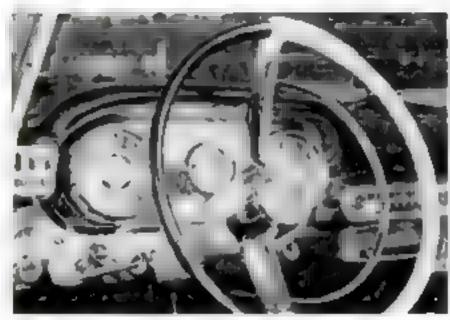
But when at day's end the men in charge of the Thunderbird project climb aboard their low-slung chariots in the executive garage, homeward-bound, it doesn't take a telepathist to read their minds: "In passenger cars, here's the shape of things to come."

END



New 300 is built on its own chassis, with basic Windsor body and special grille. Power: up.

Chrysler 300D Has Built-In Roar



SPEEDOMETER registers up to 150 m.p.h — which is little exaggeration of potential. On straightaway, car has hit up to 144 m.p.h.



change for 1958. From start, the car has been notable for sparse use of chrome ornamentation.

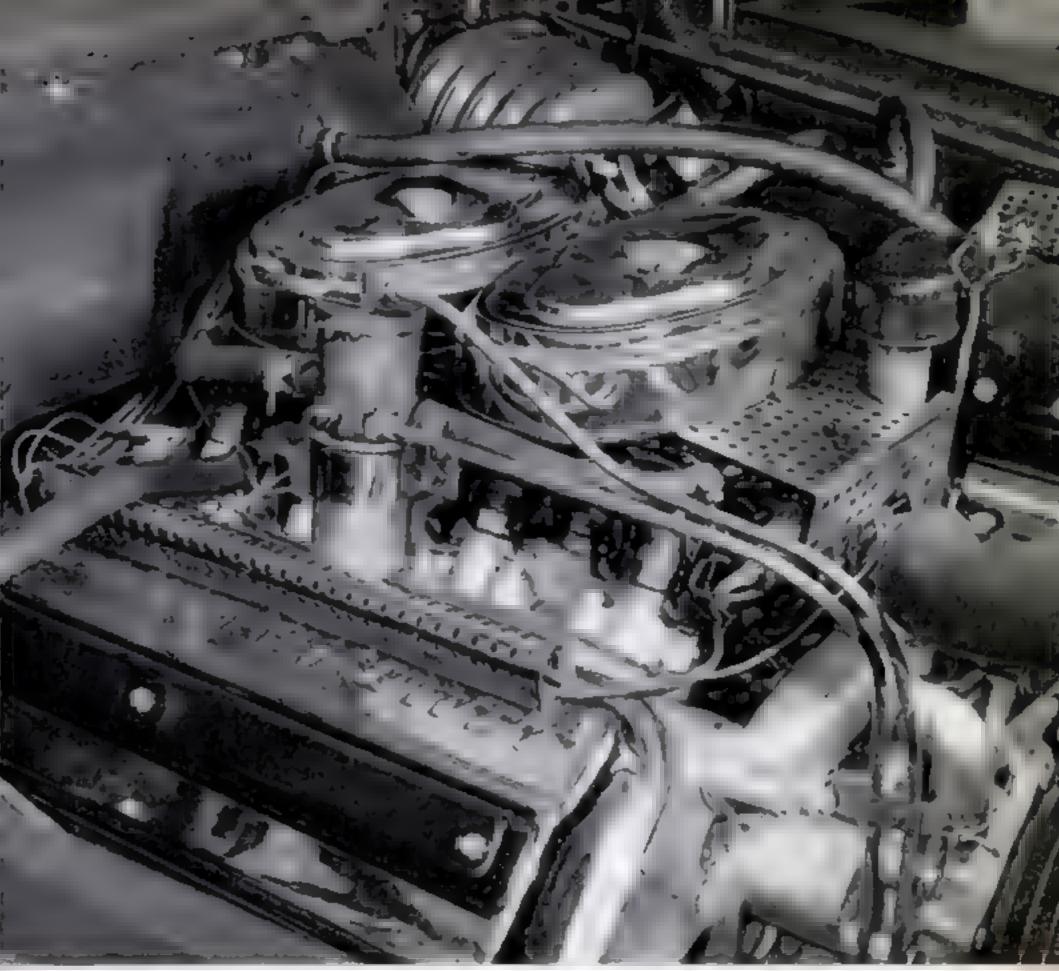
Corp. known awesomely as "Central Engineering" was startled and puzzled a few months ago when it was asked to design a carburetor air cleaner without an air silencer. This simply wasn't done. Everybody used air silencers. How come no silencer? asked Central Engineering.

The answer emerges with the introduction of the Chrysler 300D, fourth annual version of the corporation's "bomb."

Bob Rodgers, Chrysler Division's chief engineer and originator of the "300" idea, wanted his customers to hear as well as feel the car's power. The result is music. At hard throttle, the in-going air is a baby tornado, yet at cruise only a whisper. To bracket his power package with sound, Rodgers removed some of the muffler baffles. Result: an authoritative mutter at the tailpipe.

At \$5,108 factory retail, including federal excise tax and dealer handling (compared with \$4,759 for a two-door hardtop Imperial), the "300" is up five notches in horsepower from 375 to 380 That's with carburetors. Add 10 more for the Bendix fuel injection (PS, Mar. '57).

Like any "personalized" car, the "300" has become a product of its owners' desires. When it was first introduced, Chrysler assumed that it would be bought by men in berets and sports jackets. But perfectly conservative businessmen bought it to drive something a little different.



New electronic fuel-injection system boosts power, gives performance without long warmup.

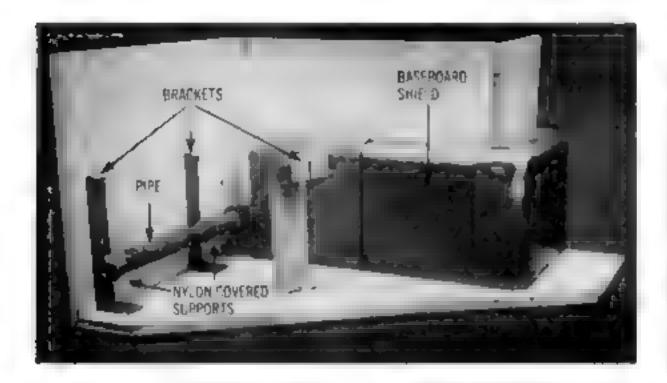
They wanted such things as air conditioning, limited-slip differentials and automatic boxes. And they got them

Like its predecessors, the 300D is a bit rough at idle. That's due to exhaust-gas dilution of the incoming gas-air charge at low engine speeds, and that's caused by a cam designed for high-speed performance. The ports stay open longer but snap open and shut faster than those in the Imperial or New Yorker. Valve trains are wholly mechanical. That permits engine speeds up to 5,200 r p m some 400 more than hydraulic lash-compensators, with their tendency to "float" valves, will supply.

Chrysler says the "300" is the fastest and most exclusive U. S. production sedan, and can affidavit both In 1955 and 1956, the "300" was the National Association for Sports Car Auto Racing (NASCAR grand national champion. In 1955, it was named the American Automobile Association's champion stock car In 1957 it did not compete officially, but at NASCAR's annual speed carnival in Daytona Beach it turned in the fastest flying mile for stock cars (135 m.p.h., and the fastest average speed for a mile from a standing start (86.8).

Less than 5,000 of the cars had been sold when the third year's production was closed out in 1957 and manufacture of the "D" series started. If 1,800 are sold in 1958, it will beat any of the previous years Decon Francis,

Hot-Water Heat



"Radiant ribbon" is just a pipe

PLAIN PIPE—¼-inch black steel—takes the place of expensive radiators or baseboard convectors in new home-heating plant now being tested. Pipe is installed at baseboard level on supports that also grip a sheetmetal cover. Hot water in the pipe radiates heat to the cover, which then re-radiates it to warm the room.

RADICAL new development promises to put the hot-water furnace—long a favorite for its even comfort—back into thousands of U. S. homes. It should cut hot-water installation costs in half, and give forced-warm-air heating, now the choice of three out of four homebuilders, a run for its money.

The new system is remarkably simple, and completely eliminates both radiators and conventional baseboard convectors. Instead, the hot water is pumped through a simple loop of plain 3/4-inch black steel pipe running around the house.

First tests indicate that the whole system—pipe loop, boiler and controls—can be put in a five- or six-room one-story house for about \$400 to \$450. Two men do the job in eight hours or less. (This is for new construction; it will of course take longer in an existing house.) Total first cost for conventional hot-water heat today, for a comparable house, runs from \$800 to \$900. Most of the savings with the new system come from the reduced materials cost and labor of putting heat-distributing equipment in each room.

Why hot water? Mainly, because many people prefer it. The postwar swing to warm-air heating was largely the result of its sharply lower first cost. Before World War II, hot-water systems held half the market. Either type, if soundly

designed and correctly installed, gives approximately equal comfort and operating economy.

The new system is called "radiant ribbon." It can be used in new or old houses, or in a new addition to an old house (provided you already have hot-water heat). It is an industry-wide development, but is still experimental.

How it works. The change is in the method of distributing heat to rooms. You still use a regular hot-water heating boiler (any make), circulating pump and controls. The pipe loop goes at baseboard level along the outside walls. A thin sheetmetal cover about six inches high covers it.

In operation, water up to 240 degrees is pumped through the pipe loop, and heat is radiated from pipe to shield to room. The loop is a closed circuit with the water under slight pressure so it will not steam. In the few tests made so far, the new system has performed very well.

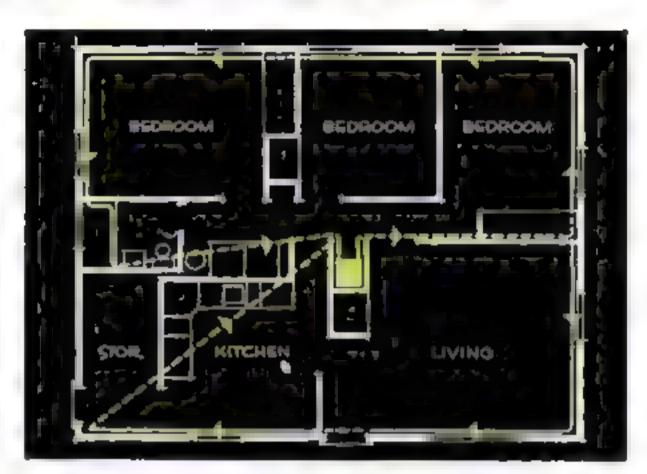
On a four-below-zero day in a Chicago test house, for example, the crucial temperature spread between floor and ceiling was three degrees—72 at the ceiling, 69 at the floor. That's pretty good. You don't begin to feel cold until the floor is more than about five degrees cooler than the ceiling.

Why it works so well. Although researchers are still not absolutely sure,

Without Radiators

Simple system may haive cost

toop of pipe around outside walls comfortably heats small one-story houses, trials indicate. Standard boiler supplies 240° water through feeder lines under floor (dash lines). Floor plan at right shows actual setup in full-scale test model of a prefabricated home. Installation of entire heating plant becomes a one-day job for two men.



two main reasons are offered by radiant ribbon's inventor, soft-spoken Edwin Tidd, one-time steam fitter who is now chief of field research for Bell & Gossett, the heating-control firm.

First, Tidd explains, most of the heat it supplies to a room is radiant heat, the best for comfort. Most current hot-water heat operates by convection—room air passing over the heating element is warmed and passes on and up, carrying the heat it has absorbed. Radiant heat, like warmth from the sun, is more direct and satisfying.

Second, the baseboard pipe strikes directly at the two main sources of cold and drafts: the exterior walls and the floor. Heat from the pipe warms up the walls behind it and the floor below it. There is no heat loss from your body to these normally cool surfaces, thus no drafts, chills or goose pimples.

Drawbacks. Before the new system can be approved for houses, a thorny rating problem must be licked. Tidd explains that according to present-day engineering tables, black steel pipe, though the best radiator among pipes, is just not rated high enough for house heating. With 240-degree water, for example, the tables say that 3/4-inch black steel will radiate only 131 heating units an hour per foot of pipe. According to the book, you

need at least 200 to 300 units for adequate heating.

In practice, however, the system evidently does this or better. Either the tables are too conservative or some unknown factor is at work

Any other limitations? Apparently no serious ones. Engineers check off these points:

- Safety? The metal shield over the pipe does get as hot as 160 degrees, but standard radiators often run hotter.
- Operating costs? Tests are still incomplete, but indicate that fuel expense will be no more than that of conventional systems, perhaps less.
- How about poorly insulated houses?
 One solution: Combine the pipe loop with a few conventional finned units, installed where you need a concentrated dose of heat.

The system sounds so simple that skeptics still do not believe it works. It not only does work, but there are now about 20 test installations operating in houses around the country. Two are in National Homes Corp. test houses at Lafayette, Ind. NHC, biggest U.S. prefab house manufacturer, hopes to use radiant ribbon in its future houses. But it may be a year or more before all test data are gathered and analyzed, and the system is officially put on the market.—A. M. Watkins.



Plain Facts About Correspondence Schools By Martin Mann

Studying at home to get ahead is a grand old American tradition. Will it work for you? Here's what you should know before you mail the coupon for a course

Part 1: What Are They Like?

Sputnik, you can spot the big opportunities coming up. As America's all-out effort to beat the Russians gets into high gear, there will be promotions and new jobs in all fields of science and engineering, in drafting, electronics and aviation, in the building, machinework and chemical trades. They'll go to men with specialized training.

You'll want to cash in on these opportunities. But most likely you have a family to feed. You can't quit your job to get additional training. Then how about correspondence schools? Can you get

ahead by studying at home?

Last year 1,200,000 people were doing it. They were upgrading their skills or learning new trades from schools they never visited and teachers they never saw. The big majority of them were like the big majority of Popular Science readers: young married men working at jobs that go with higher-than-average skills.

How does it work out? Should you, too, try a study-at-home course? It's a serious decision to make: a chance for success on the one hand, the expenditure of real money and a lot of spare time on the other hand

POPULAR SCIENCE took a hard look at correspondence schools for you. We mailed in the coupons you would be asked to mail. We visited some schools. We interviewed businessmen and educators.

What we found is revealing.

Study by mail is a big, complex and fascinating business, deeply rooted in the American get-ahead tradition. Both International Correspondence Schools and the University of Chicago Extension School started in 1891, the American School in 1897. La Salle Extension University this year celebrates its 50th anniversary.

If you take the name to cover every institution that dispenses education through the U.S. mails, there are three main groups. It pays to know how they differ

-and why

 Private correspondence schools such as ICS, National Radio, Commercial Trades—are set up specifically to sell educational services by mail

 University-extension correspondence schools are operated by about 150 regular

NEXT MONTH, Part II: What Can They Do for You?

The correspondence schools' promise is plain: advancement in your job or a better, higher-paying job. Do they deliver? For the answer, Popular Science asked thousands of existudents: Did your mail-order study help you get ahead? You'll find the results of this firsthand report in PS for March.

The big appeal: You can hold your job while studying-

colleges, mostly as divisions of state universities.

 Organizational schools are run by the armed services (PS, Jan.), large corporations, trade associations and churches.
 (Courses in religion, incidentally, are also offered by the private correspondence schools.)

One group of study-at-home organizations—guided-reading institutes such as

Alexander Hamilton Institute—differs from the others in an important way. They provide books and instructional material, but no examinations. The atudent does not send his work back for grading, but as he goes along in the course he can ask for consultation and assistance.

All three groups have their uses. It's particularly the university and private correspondence schools, though, that cater to your ambition to invest off-the-job time in getting ahead at your job. Their courses are much alike.

The universities, naturally, lean heavily on standard college fare. Languages are by far their most popular courses, but the list of offerings covers all fields.

We will concentrate on the private schools because they offer the university

subjects and many, many more. Most popular are the upper-level skilled trades—radio-TV, air conditioning, drafting and the like.

The private schools are also the biggest; they appeal to more career-minded men than any other group. Excluding those in the armed services' program, the vast majority of correspondence students—better than 80 percent—are enrolled in the private schools. How do they operate? Here's what happens after you send in that coupon.

Signing up. Your coupon inquiry will bring back by mail a sample lesson and some inspirational literature. It's designed (a) to find out roughly what kind of

person you are, and (b) to convince you that you should sign up for a course.

Will a salesman call on you? Could be. Fewer than a fifth of the schools send out salesmen—but these include some of the largest schools: specifically, the oldest, biggest and best known, ICS.

The better schools now choose a salesman—he's called a field representative or, simply, a rep—to be like the ideal life-

Lesson Questions

He sure to number your Answer Sheet 2B.

Place your Student Number on enery Answer Short.

Most students want to know their grade as once as possible, so they mail their set of answers immediately. Others, knowing they will finish the next from within a few days, send in two sets of answers at a time. Either practice is acceptable to me. However, don't hold your answers too long; you may lose them. Don't hold answers to send in more than two sets at a time, or you may run out of issuess before new once can reach you.

- If a pulsating de voltage which varies from 15 volts to 1 volt has a de component of 8 volts, what is the peak value of the ac component?
- 2. What instrument is usually used by technicians to measure resistance?
- 2. Name the fire types of resistors conseasily used in electronic equipment.
- 4. If the current flowing to a circuit is 100 mile when the voltage is 30 volta, what will the current he if the voltage is reduced to 25 volta?
- 4. Draw a schematic diagram of a circuit showing a battery with 3 resistors connected in parallel across it.
- 6. What will the current be in a circuit where the voltage is 100 volts and the reputance 100 obess?
- 7 Give the three ferms of Ohm's Law
- L in the circuit shown, the sum of the voltage drops across resistors R1, R2, and R3 will be (1) equal to, (2) more than, (3) less than, 100 volts.

EXAMS ARE NO SNAP: One comes with every lesson, usually looks like this (above). It was taken from an early lesson in

insurance salesman. They look for a stable, respected member of your community, a friendly source of expert counsel. His commissions depend on keeping you studying, so he's not much interested in selling you a course you'll drop. In some cases, he is specially trained to serve as a guidance counselor.

The rep will telephone your wife to set a time when he can talk to you both. Her cooperation is essential because you will be studying at times when otherwise you might help her with the kids or take her to the movies.

Enrollment. Whether the approach comes in person or by mail, the schools try to guide you into a course that

at a fraction of the cost of going away to regular college

will prove useful and within your scope.

A very few private schools insist that you have a high-school diploma (55 percent of correspondence students do). But most have no set requirements for previous education. Their basic tenet is that they can train almost anybody. In general, they have made good on this claim. The first few lessons in all courses are elementary. In technical subjects, for in-

simple, understandable documents—no fine print, no legal gobbledygook. But they are contracts, just as binding on you as the installment paper you sign when you buy a car or a house.

One says bluntly that cancellation is not permitted—once signed up you are committed. Others permit cancellation, but still require payment of a sizable

part of the total fee.

The cost, naturally, varies directly with the number of lessons. A course that takes a year or two -TV repair or a "unit" of engineering, for instance—runs from \$200 to \$300. The complete four-to-eight-year engineering course, preparing you to take the state exam for a professional engineer's license, would come to \$1,000. By contrast, the average cost of attending a regular college is \$1,600—for one year.

The fees generally cover everything—books, tools, instruments, experimental equipment. And you pay on the installment plan, as you

study.

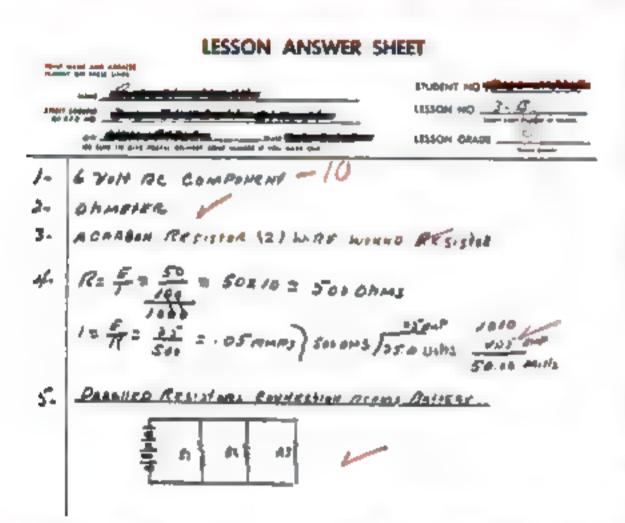
The leasons. They're really booklets, some running to 100 pages with full-color illustrations. Most are not so elaborate, though.

The writing is straightforward, the subject matter

simply and logically developed. The schools' claim—that if you can read English, you can follow the lessons—seems well founded. Up-to-dateness varies; in general it's good. A text on portable radios, for example, covers transistor models.

The fetish of simplicity has its draw-backs. Take the case of an elementary lesson on one-cylinder gas engines (from a school that could not be considered among the best). After looking it over, one PS editor commented: "This is all right in a dogged sort of way. But the method leaves it up to the student himself to get beyond his own sticking points;

[Continued on page 278]



a TV course. Actual answer sheet from a Louisiana student is at right. He flubbed the first problem, but ended up with a B.

stance, beginning lessons review highschool math.

We pursued this point with some correspondence-school administrators. Suppose a man whose mathematical ability is limited to fourth-grade arithmetic wants to take a course in engineering or accounting? The usual strategy: Try to steer him into something simpler.

Some schools—particularly those specializing in art and writing—flatly refuse to accept students who obviously lack natural talent. But this attitude is rare. So don't overestimate your own capacity. Be realistic at the start.

The contract. The ones we examined (from large and reputable schools) were

The Building One Man Can Carry



IGHT enough to tote on one shoulder, the bundle shown above can be ballooned into a weathertight and durable building measuring 40 by 80 feet. Paper-thin, vinyl-treated nylon does the trick. Inflated to mushroom shape with hardly more air pressure than you'd find in a soap bubble, it produces one of architecture's weirdest, yet up-and-coming structures—the "airhouse."

Today our armed forces and industry alike are finding a multitude of uses for these easily set up, highly mobile shelters —all based on a pilot model developed by the Cornell Aeronautical Laboratory in 1948. They're serving as radar shelters in the Arctic. They're being used as storage sheds by chemical, petroleum and steel companies. And according to John Whisman of the Irving Air Chute Company-a leading manufacturer of airhouses—the time will come when you'll watch outdoor movies and baseball and football games beneath huge protective domes of nylon. He also foresees a day when standard family camping equipment will include an air-supported tent, inflated with a tiny, battery-powered blower.

The big attraction of the airhouse to industry is its low cost. With the price

By George Laycock

of lumber, steel and masonry still going up, conventional structures for storage are expensive. But a 38-foot, hemispherical airhouse costs only about \$1,600, in-

cluding a blower.

There are other factors favoring the airhouse. It can be set up by unskilled labor. A crew of four men without training can erect a 40-by-80-foot model in four hours. Airhouses need no floors, and no special footings or other supports. If it's advisable to relocate them, you simply shut off their blowers, let them collapse, and carry them to the new site. They can even be placed on sloping ground, for they follow the contour of the land and form their own seals.

To erect an airhouse you simply stretch it out, fasten the bottom down with sandbags or metal strips and turn on the blower. Within a matter of minutes the building has expanded to full size.

The squirrel-cage-type blowers used for airhouses are usually nine inches in diameter and seven inches across. They're powered by ½-hp. motors. These run constantly to keep the structure erect, drawing about as much current as a 300-watt light bulb. Once the house is inflated, the blower recirculates the air within it, preventing any further build-up of pressure. This pressure, incidentally, is only slightly greater than that of the atmosphere outside.

This is one house where you don't dare leave the door open very long. But to prevent leakage, the doors need be nothing more than flaps that are sealed with zippers. More elaborate airhouses have either revolving doors or double doors with an air lock between them.

They're rugged. Already the users of airhouses have learned that hazards to









simple oook of this nature igloo, is a zippered flap that seals in our used for inflation.

fork trucks enter this storage airhouse.



the strange-looking structures are fewer than they once imagined. A boy with a BB gun can't make a hole in the tough plastic. Even if he could, the tiny hole wouldn't deflate the house. Hail stones—even the largest ones—bounce off the material without injuring it. Heavy ice and snow are cleaned off by the shifting air pressure below. The added weight makes the fabric roll and bounce, and the load loosens up and slides off to the ground.

These inflated houses are so tough that workmen can lean ladders against them and walk around on top if necessary. They can even stand on them while they go up. When it comes to taking high winds, airhouses are better than many standard-type buildings. In the Arctic, where the armed forces have had plenty of experience with them, they've withstood blasts of 150 miles an hour.

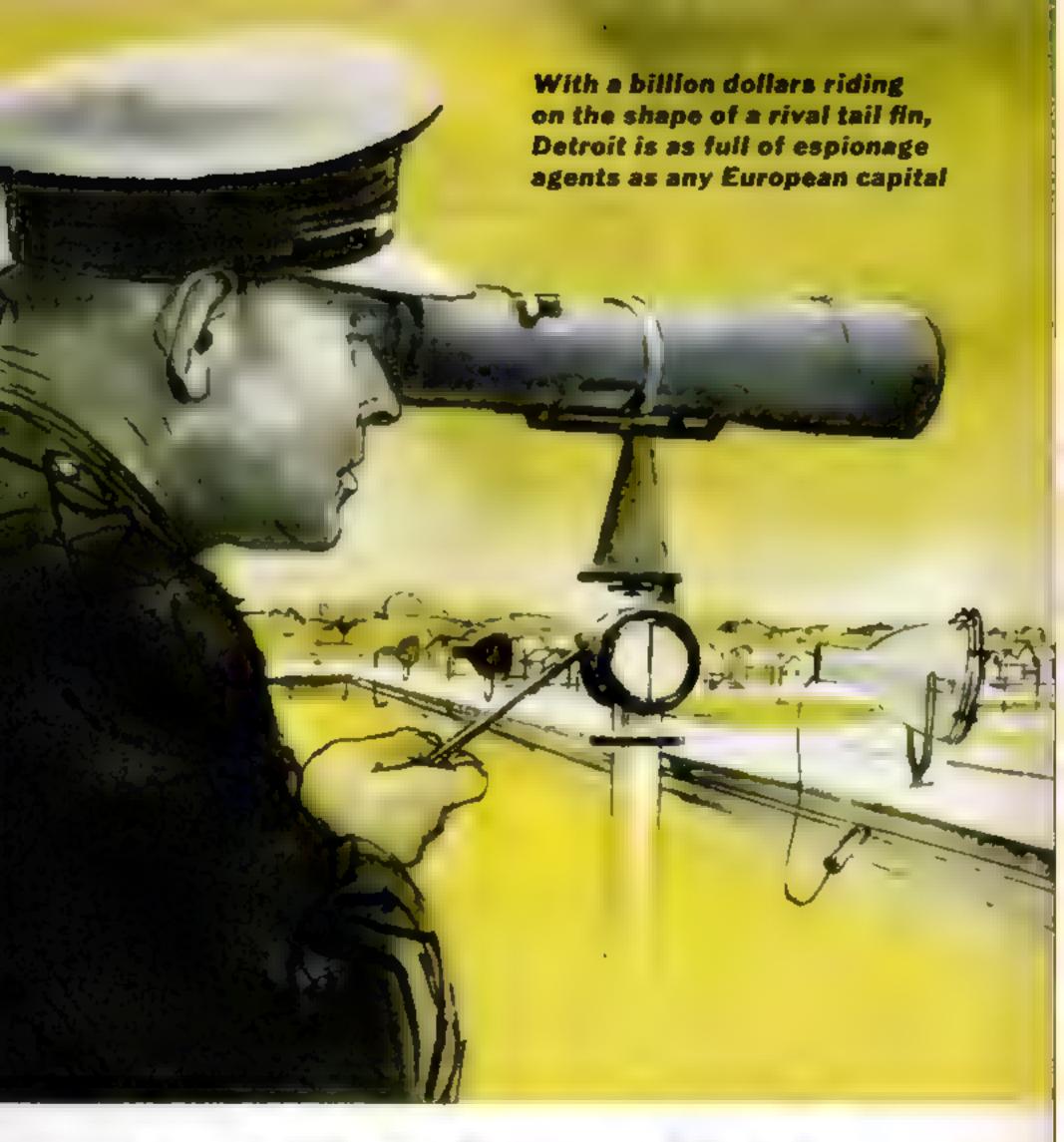
Even an electric-power failure can cause little damage. The house simply settles down over the materials inside it. When the blower starts again, it balloons back into position. Should the fabric rip, it can quickly be repaired with a patching kit supplied by the manufacturer. This kit contains strips of the same material used for the house, along with cement and a brush.

One of the big problems still facing builders of airhouses is heating and air conditioning. This is still costly, as the thin nylon has poor insulative properties. On the other hand, air conditioners have been used successfully to keep some airhouses inflated.

Home builders are beginning to use airhouses to cover buildings under construction. With such weatherproofing, they can now work during the bad months that formerly brought building to a standstill. They can even purchase an expandable airhouse. As construction progresses, the airhouse covering it grows, too. It's this easy—you just zipper an extra section onto it.

Life expectancy of an airhouse is about seven years. It takes that long for ultraviolet rays to break down the vinyl coating on the fabric. But chemical laboratories are working on this problem, and the chances are good that airhouses of the future will last longer, further increasing the number of useful purposes they serve.

32 POPULAR SCIENCE



How the Auto Makers Spy on Each Other

By James Jones

OWHERE is commercial spying practiced more assiduously today than in the auto industry. With billions of dollars in sales riding on the public's whims, and with as much as

three years' lead time needed to ready a new model, an auto maker must know quickly and accurately what nasty surprises his competitor is brewing.

If Ford plans to move the transmission back to the rear-axle area in 1960, as some spies say, thereby eliminating the

Undercover men use all the cloak-and-dagger dodges, but

tunnel bulge, Chrysler wants to know how it's done. If Chrysler plans unitized bodies, as some spies hint, Ford wants to know how they differ from those on the 1958 Lincoln. If GM is engineering cantilever roofs, as some spies insinuate, everybody wants to know how and when. Hence, industrial espionage—and plenty of it.

Detroit intelligence agents achieve extraordinary success. Details of the 1958 models now on the road were known to all auto makers before mid-1956, in some instances before 1955.

Last July, Jack W. Minor, the Plymouth sales V-P, addressed 2,200 dealers. He showed them photos of all the 1958 cars—except Chrysler Corporation's, Idea: Let salesmen see what they'd be up against in the 1958 sales struggle. By then every other auto maker knew exactly what Chrysler cars looked like, and what engineering features they did and didn't possess.

"You concede that the competition is aware of your plans a year in advance," says C. Torrey Adams, the ex-FBI agent who directs Ford Styling Center security. Even the best protective screens break down by then because so many people have been cut in on the hot scoop.

The critical period is 18 to 48 months ahead of production. An auto maker who

Keys and locks to styling offices, made in the plant, can be changed in an hour

34 POPULAR SCIENCE

can steal a competitor's idea that early picks up a trump card. He has time (a) to apply the idea to his own products, or (b) to counter the idea.

"If I aim a punch at a guy's head," says Adams, "he can get set to block it. That applies here. If one company knows what another has coming, it can set up advertising and sales-promotion arguments in advance to counterattack."

The angles are many and devious. Take The Case of the Spinner Grille, a classic of auto espionage. Ford stylist George Walker designed a spinner—an airplane propeller-hub sort of thing—into the 1949 Ford. Then his agents turned up a photo of the 1949 Pontiac, also with a spinner in the grille, This was nine months ahead of Pontiac's introduction date

Considering Detroit's knee-in-the-groin tradition, Walker could have smiled and kept his mouth shut. Ford was coming out first. Pontiac would have looked foolish presenting an apparent copy of a Ford design.

Walker, however, working on the theory that it's okay to maim the competition but not to kill them, boldly broke the news to GM's styling chief. It cost Pontiac a fortune to crash-program a new grille

When Walker became Ford's vice president and director of styling, he ordered Adams to cinch up the security web. Adams began by reducing the number of people allowed to see advance models. Some 2,000 employees were then authorized to visit Styling; now it's 300.

"We're trying constantly to reduce the number of exposures to new models," says Adams. "That way, you make information less clear and you slow down transmission."

Adams took other semi-military steps: A badge system limits the movement of authorized visitors. Color codes bar visitors from sensitive areas.

The \$11.5-million Ford Styling Center sits far back from main thoroughfares. Guards watch every visitor, wherever he goes. They even man a roof-top spotting scope to scan surrounding areas.

All keys are cut and all locks assembled right in the Center. Every lock could be changed in less than an hour. Waste-

get the Big Picture by swapping secrets with fellow spies

baskets have locked lids. Their contents are burned at Ford's power station by guards. Obsolete mockups are crushed by buildozers.

About the only place left from which spying can be done is overhead. Adams is studying baffles to screen the patio where mockups are viewed in natural

light. "Even if nobody [in a plane or helicopter] is taking pictures," says one official, "you never can feel sure that they aren't."

The crudest spying techniques sometimes work. Take the Pontiac stylists who wanted a preview peak at the new Lincoln in the sheet-metal, not just in photos. Carrying rolls of blueprints, they marched boldly through a side door of the Lincoln plant posing as Lincoln employees, and casually strolled down the assembly line.

Unfortunately, a Lincoln supervisor had once worked for the Pontiac men. They saw each other at the same time. The Pontiac interlopers wanted no truck with their ex-colleague-

not while trespassing, anyway—but he ran after them to say hello. What followed looked like a Laurel and Hardy movie. The Pontiac stylists dodged around the assembly line, backtracked, and dived through strange doors before escaping.

One of the main loopholes in security is people. They talk. To lock loose lips, Adams runs a persistent educational program. Everyone is taught that leaked data can easily hurt Ford-and the jobs

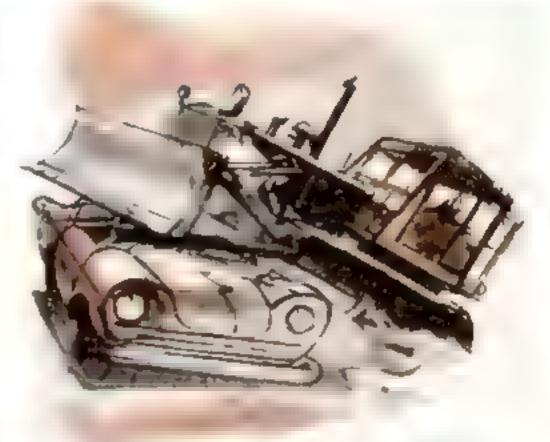
of Ford people.

"Some of the greatest leaks, I'm afraid, come from the top," said one Big Three official, "The brass will be gathered at the Detroit Athletic Club or Bloomfield Hills Country Club, at a party or in a locker room, and accidentally let fly with some secret of more than passing importance."

Sometimes a slip of the tongue tips off more than the boys in the locker room. During a press preview of Chrysler's 1954 cars, Chrysler president L. L. Colbert was asked if the corporation planned a sports car. Colbert said no. then added: "I suppose all you fellows know that Ford is going to build 15,000 sports cars next year."

The fellows didn't know, but sure enough, along came the Thunderbird.

Even security-wise engineers get mousetrapped. It happened to George Huebner,



Priceless secrets of futuristic models die with the mockup—crushed by a buildozer

chief of Chrysler's automotive gas-turbine project.

He was test-driving the still-secret turbine in an innocent-looking 1954 Plymouth. One evening he took the car home. His young son David badgered him for a ride. Huebner agreed, And how about the kid next door? Okay.

But when they stopped for the neighbor's boy, waiting there, too, was the neighbor himself—a well-placed executive in a competing company. He got in. knowingly eyed the elaborate instrumentation and went for a ride. "What could I do?" says Huebner.

All auto makers deny that they pirate competitors' employees to pump them, but it's public knowledge that stylists and engineers are as mobile as the Detroit Red Wings hockey team.

On the one hand, a company man states, "We would not hire a man who came to us with competitive data to sell. He might leave us in a few months and go somewhere else to sell."

On the other hand, an ex-Chrysler

stylist revealed that he devoted his first two months on a new job to sketching what he could remember of "Forward

Look" designs for the future.

Another rich lode thoroughly picked over by spies is the Rackham Building, headquarters of the Engineering Society of Detroit and meeting place for the Society of Automotive Engineers and other professional groups. An intelligence operative, armed with an expense account and membership in one society or the other, can cement friendships with any number of engineers. Over a casual aftermeeting beer, any number of tidbits can be netted.

Conventions of machine-tool builders, glass manufacturers and other automotive suppliers are also religiously attended by the snoop-and-poop forces. They meander from one hotel hospitality suite to another, sipping neighborly drinks, making small talk—and getting the lowdown on what the competition is working on.

Detroit's many small tool-and-die shops are a milk-run for the agents. Says one spy: "We had the word almost immediately last year when GM kicked off a crash program to revise some of its '58s. Every die shop in town suddenly

filled up."

Spy headquarters (called "competitive data" or "advanced product planning" offices) are hidden in the engineering department or the industrial-relations section, out of which security forces operate. Here is where the real pros spend every working hour compiling, discarding and interpreting news of the opposition's plans.

Contrary to common belief, these agents are all known to one another. Within limits, they freely exchange

knowledge.

Much of the work consists of telephone calls between competing spies, who ask outright about future cars. One rule remains inviolate: The spy never goes directly to the competitor about whom he wishes to inquire, and he never talks about his own company's future products. But he'll spill all he knows about anybody else's dream stuff. Thus, a conversation between a Studebaker-Packard agent and a Chrysler spy might go this way:

S-P: "Did you know that Buick has

frozen the design of that new transmission we were talking about?"

Chrysler: "No, I didn't. Very interest-

ing."

S-P (tactfully): "By the way, can you tell me whether Mercury has discarded the spare tire for '59?"

The Chrysler man may know—and tell. At the same time this discussion is going on, Ford and another Chrysler agent may be exchanging dope about Pontiac and Rambler. Information has been traded; quid pro quo has been maintained—and "secrets" flow as steadily as Chevys off an assembly line.

How does a spy get in the business?

One described it this way:

He had been working as an engineer in a nonautomotive division of his company. He was given a temporary job in an auto division (to test his engineering qualifications). Then he was invited to join the espionage staff. He hadn't any notion of where a spy even begins

to spy.

Shortly, he was invited to lunch with two engineers from two other companies. Conversation was casual, seldom touched on business. Soon after, though, one of his luncheon companions phoned to ask if he, perchance, knew that XYZ Corp. planned a clear-plastic roof insert for 1960. No, he didn't. Before the conversation ended, his caller discreetly inquired about a suspension under development at yet another company. The files he had inherited produced the information.

Then he began receiving envelopes bearing no return addresses, but containing pictures and specifications of competing cars. Who sent them? The guy who telephoned next day for information about a different competitor. That's who. Our hero was in business.

Within a few months, his files of secrets bulged like John Foster Dulles' briefcase. (If this revelation of bold, bald blabbering is disappointing and deglam-

orizing, we're sorry.)

Why spy? Sure, information is traded—but never about the trader's own company. The massive intelligence effort is worthwhile because of the billion-dollar stakes the industry gambles every year. There's always the hope that you can play your own hand close to your chest—but divine what cards the other guy holds.

What Science Is Learning About

Headaches



There's no simple solution to this age-old curse, but now research has turned up some good advice for chronic throbbers

By Milton Silverman

RECURRING, chronic headaches today afflict nearly 20 million victims in the United States.

They represent a major cause of absenteeism in American industry, hitting hardest the intellectually superior workers.

They mark a major mystery to doctors, and have caused one physician to remark, "If I wished to show a student the difficulties of medical practice, I'd give him a headache to treat." They are enigmas.

And to Western civilization, they serve as the most impregnable of all social excuses, enabling millions of men, women and children to avoid unappetizing parties, committee meetings, delicate family conferences, and even homework.

Who gets headaches? Last summer, at the annual convention of the American Medical Association, Dr. Henry Ogden of Louisiana State University revealed that these painful attacks seem to follow

FEBRUARY 1958 37

a strange but suggestive pattern. On the basis of a study of 4,634 subjects, he found that headaches—including the common, non-chronic variety—were reported by about 60 percent of the general population: 71 percent of the women and 51 percent of the men. They were strikingly more common among the young rather than the old, among the single rather than the married, among the educated rather than the unlearned, and among executives and professionals rather than salesmen, manual workers and farmers.

"It is obvious," one medical observer declared, "that the best treatment for headache is to be an unschooled, happily married farmer aged 80 or 90. Unfortunately, this is a treatment which I can only rarely prescribe for my patients."

To the host of patients who suffer constantly from headache, and to their friends and relatives who suffer with them, the most desirable prescription would be a pill, an injection or a surgical operation that would end the ailment once and for all. In spite of thousands of years of study, except for a few special conditions, medicine has turned up no such simple answer. Medical men have investigated headache by using professional head-standers, putting human volunteers into giant centrifuges, dosing them with hundreds of possible headacheproducing chemicals, pulling and probing exposed brain tissues in conscious patients undergoing brain surgery, and injecting gases and liquids to build up pressure inside the skull. But even after all this research, doctors are not completely agreed on the machinery involved in the most common varieties of headache.

What causes that throbbing? Contrary to a widely held belief, most headaches are not caused merely by increased pressure in the head. The cranium can stand remarkably high internal pressures without producing symptoms. Probably the most important mechanisms, Dr. H. Houston Merritt of Columbia University stated a few months ago, are distention and swelling of blood vessels within the head, inflammation around the head arteries and nerves, and direct pressure on the nerves in the head and neck. Any one of these alone, or a combination of them, can result in misery.

But what triggers these mechanisms?

Where should we search for their cause?

If there is any agreement in this hotly controversial field, it is that most head-aches have no single or simple cause. A headache is not a disease in itself, but—like fever—is a symptom of disease.

During the past few years, medical researchers have come closer to an understanding of the basic ailments that may hide behind a headache. In more than 90 percent of all cases, headaches are not connected with brain tumor, brain infection, hardening of the brain arteries, trouble in the eyes, nose, sinuses, ears or teeth, a hit on the head, or even the frequently blamed stomach upset.

"Constipation and gastrointestinal disturbances are reputed to be a common cause," said Dr. Merritt, "but their importance has been greatly exaggerated."

This does not mean that all these and other factors may not have some significance. There is ample evidence that eye strain, hunger, sinus infections, overeating, loss of sleep, and overindulgence in alcohol may serve as aggravations. But in most headache patients—at least, in most of those desperate patients who go to a doctor for help—none of these can be indicted as the arch-criminal.

With more than 90 percent of these chronic sufferers it now seems that two major types of disorders are involved. One is the so-called tension headache. The second is the notorious migraine headache. Each has different characteristics, which most patients and nearly all physicians can recognize, and each usually requires different methods of control.

The tension headache is probably the most common of all. It occurs more frequently in women—or, at least, women more often go to their doctors about it. It is only rarely preceded by any warning signs. It hits frequently, and 30 percent of the victims complain of daily headache. The pain usually starts at the back of the head, moves forward and involves both sides, and is described as a combination of burning, pressing and throbbing.

The typical victim says, "It feels as if my head were in a vise."

Sometimes the pain is violent and completely crippling. But at other times, a panel of experts stated recently, there is "a tendency of the patient to exaggerate the extent of the headache, to portray it in melodramatic terms and to boast of the suffering he is compelled to endure. ... However, such headaches rarely interfere with work, play or sleep."

Behind these headaches is usually a case of emotional tension—of worry, anxiety, fear or nervous strain. "These are tensions that would normally make a person blow his top," says one psychiatrist. "But the headache patient doesn't blow his top. He bottles up his tensions and gets an ache in his top instead."

Many sufferers are inclined to blame their symptoms on such obvious indiscretions as smoking too many cigarettes. But several investigators claim it is usually some underlying emotional pressure that is causing both the excessive amoking and the headache.

Some victims are inclined to interpret their symptoms as a sign of impending insanity. They may think, "Maybe I'm losing my mind." But there is no particular relationship between headache and insanity; as a matter of fact, patients in mental hospitals have been found to be remarkably free of headaches.

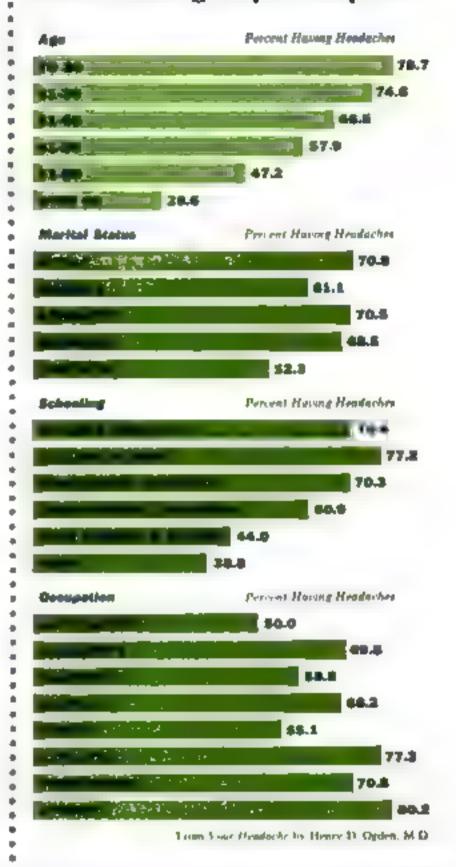
Relax and feel worse? So-called tension headaches sometimes appear just at the time when tension seems to be suddenly released. These involve what some doctors call "relaxation headaches"—the Sunday headache of the businessman, the Monday headache of the preacher, the day-off headache of the nurse, and the post-examination headache of the student.

Once a tension headache starts, the pain can usually be relieved by a pill. In some cases, any pill will work. For example, during a New York study involving more than 5,000 subjects, it was found that placebos—inactive "dummy" pills—reduced the pain in about 55 percent of the victims. More help, however, was obtained from aspirin or some other pain-killing compound, sometimes given in combination with a mild sedative. In the New York study, the best results—71 percent of the patients relieved—were recorded with such an analgesic-sedative combination.

Stopping such tension headaches is one problem. Finding a way to prevent them—to get permanent relief—is even more difficult.

"A person with a headache," claims Dr. Louis Moench of the University of Utah, "may find himself on an excursion

Who gets headaches most? Here's how groups compare



to an ophthalmologist, otolaryngologist, neurologist, dentist, psychiatrist, osteopath and chiropractor. Thereupon, he is X-rayed, massaged, fitted with glasses, relieved of his turbinates and teeth, and too often emerges with his headache intact."

Well-meaning friends—or not-so-well-meaning enemies—may confuse tension headaches with imaginary illness, or accuse the victim of shamming or gold-bricking. But, as millions of pain-stricken patients know only too well, and as many of their friends and enemies eventually discover for themselves, there is nothing imaginary about tension headache.

What about tranquilizers? In some instances, the tension can be temporarily

relaxed by the regular use of these drugs. One such compound, Miltown, was introduced as a general tranquilizer after a Florida psychiatrist first found that it prevented tension headaches. But the problem is not permanently solved until the patients learn how to live without excessive tension—to solve their marital problems, understand their children and their in-laws, get along with their fellow workers, and learn how to accept themselves and their environment.

One victim of constant tension headaches, for instance, found his pain stopped when he finally admitted to himself that he would never set the world on fire, but nevertheless could have a perfectly satisfying career as a good husband, father and citizen. Another—a hard-driving, energetic young man constantly racing against deadlines—found the answer to his problem by having a serious heart attack.

"It wasn't having the attack, or surviving it, that cured my headaches," he said later, "But afterwards, when I learned to relax and live an easier life to spare my heart, I found my headaches had disap-

peared."

The migraine headache is the second most common variety. Just as with tension headaches, emotional factors are also believed to play a key role in setting off these attacks. This awesome form was recognized at least 5,000 years ago, and ancient Babylonians attributed it to the activities of a demon named Tsihatho.

While tension headaches most often begin without warning, migraine headaches are usually preceded by one or more ominous signals. A few hours before the pain strikes, some migraine sufferers feel oddly depressed or irritable, while others become suspiciously happy and elated; one patient, for example, recognized this latter warning sign by observing, "I feel dangerously well today." Still others usher in their bouts by dizziness or nauses

Once the actual headache begins, it is usually limited to one side of the head —the word migraine comes from the Greek hemi, for half, and krania, for akull---and is almost always described

as a throbbing pain.

Migraine occurs much more frequently in women, with approximately five female to every two male victims. In nearly twothirds of all migraine patients, there is

a record of the disease in other members of the family. It has been found in chil-

dren only 18 months old.

Migraine has been blamed on everything from allergies, nicotine, alcohol, vitamin deficiencies and hormone imbalances to neck strain, eye strain, and constipation. Some of these factors, notably certain allergic reactions, may play a contributory part; but there appears to be no generally accepted evidence to show that any of them plays the major causative role. Instead, according to Dr. Arnold P. Friedman, chief of the famed Headache Clinic at Montefiore Hospital in New York, doctors are now beginning to realize that there is a psychological pattern characteristic of migraine victims,

"In recent years," he told a medical meeting, "studies have indicated that many patients with migraine are meticulous, neat in appearance, rigid in their thinking, and excessively aggressive to-

ward their environment."

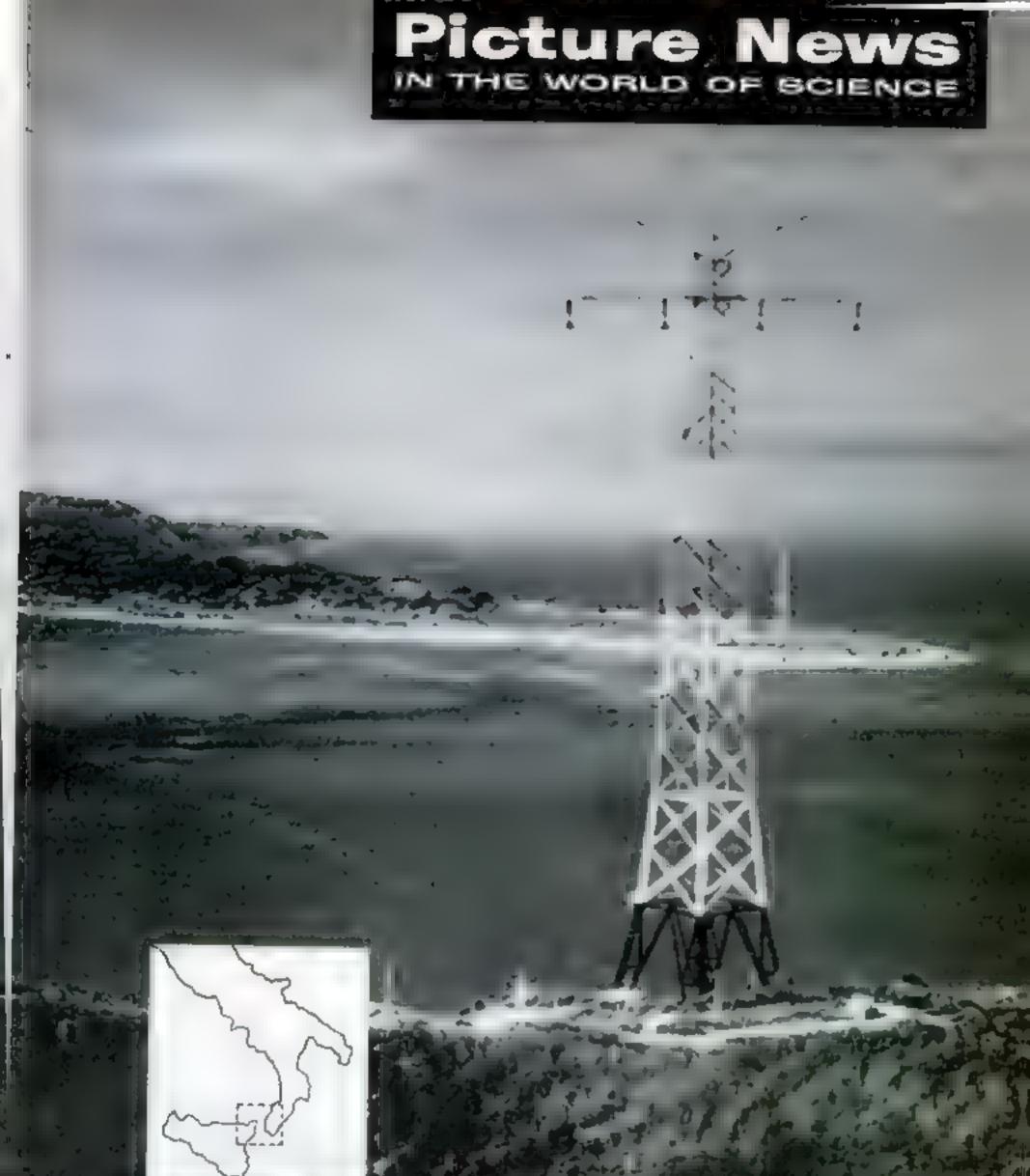
Other workers have described such people as unyielding perfectionists who demand a flawless performance from every-

body, especially themselves.

In past years, almost every major specialty in medicine has temporarily adopted migraine as part of its medical domain and reportedly found a "cure" for it. Ophthalmologista have claimed that correcting vision gave relief to more than 90 percent of the victims. Allergists have announced cures or dramatic improvement in 50 to 80 percent of migraine cases by desensitizing the victims, or keeping them away from offending pollens or foods. Bone surgeons have claimed 85-percent success by applying traction to the neck. Endocrinologists have described excellent results with sex-hormone treatments, and internists have noted equal success with injections of vitamins or minerals. Such brilliant but generally unconfirmed assertions have caused some observers to wonder whether the "cured" patients were really migraine victims in the first place.

What stops migraine? Patients with true migraine, when stricken by their aches, are rarely helped by any dummy pills. Ordinary headache remedies give them little relief. For them, the most effective compound appears to be a chemical that has no direct effect on pain

[Continued on page 236]



Giant line carries power across Straits of Messina

STRETCHING between Scylla and Charybdis, rock and whirlpool of Homer's epic, this 220,000-volt power line between Italy's boot and Sicily is an engineering wonder. Built by the Societa Anonima Elettrificazione, its 740-foot towers, 11 985 feet apart, carry steel and aluminum cables dipping to 230 feet above the sea to stand wind and seismic stresses.



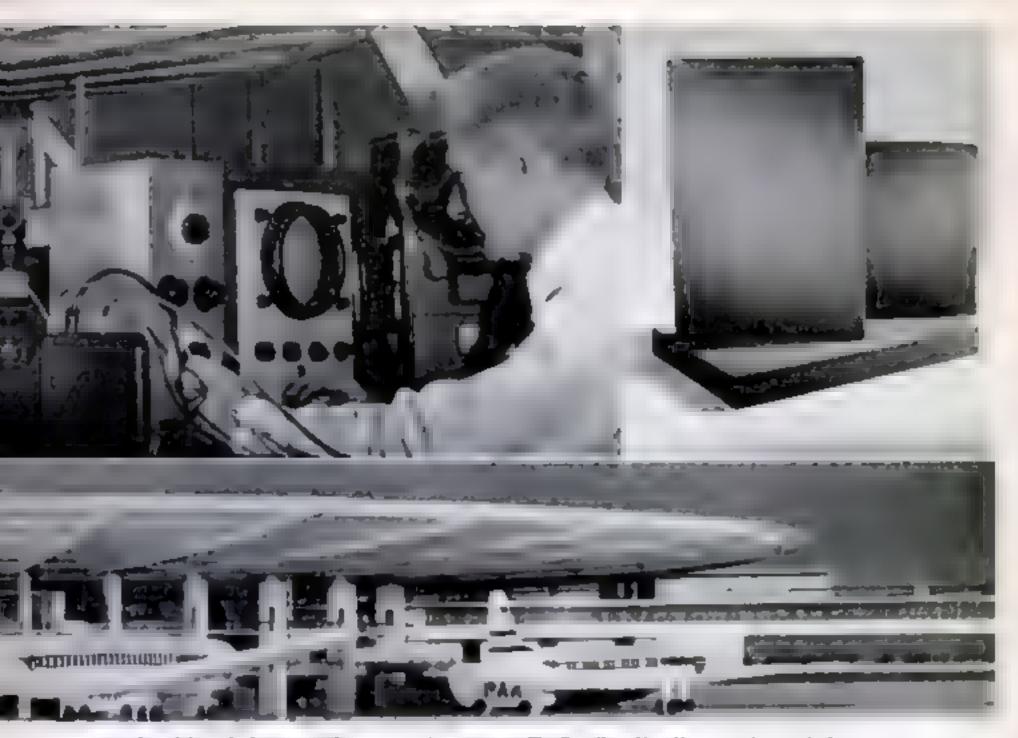
Jet age coming: they're soundproofing an air terminal

How do you spare the people in the waiting room the din of taxiing jets? The answer, in Pan American's new terminal (shown in model above) at the New York International Airport, is soundproofing for the

Mountain moves two miles; becomes roadbed in lake

A TWO-MILE conveyor system (below, left) moves 83,333 tons of gravel a day from a mountain to barges (right) to be used as fill for a 13-mile roadbed for the Southern Pacific across Great Salt Lake. Main belts take loads up to 5,000 tons an hour, travel 850 feet a minute.



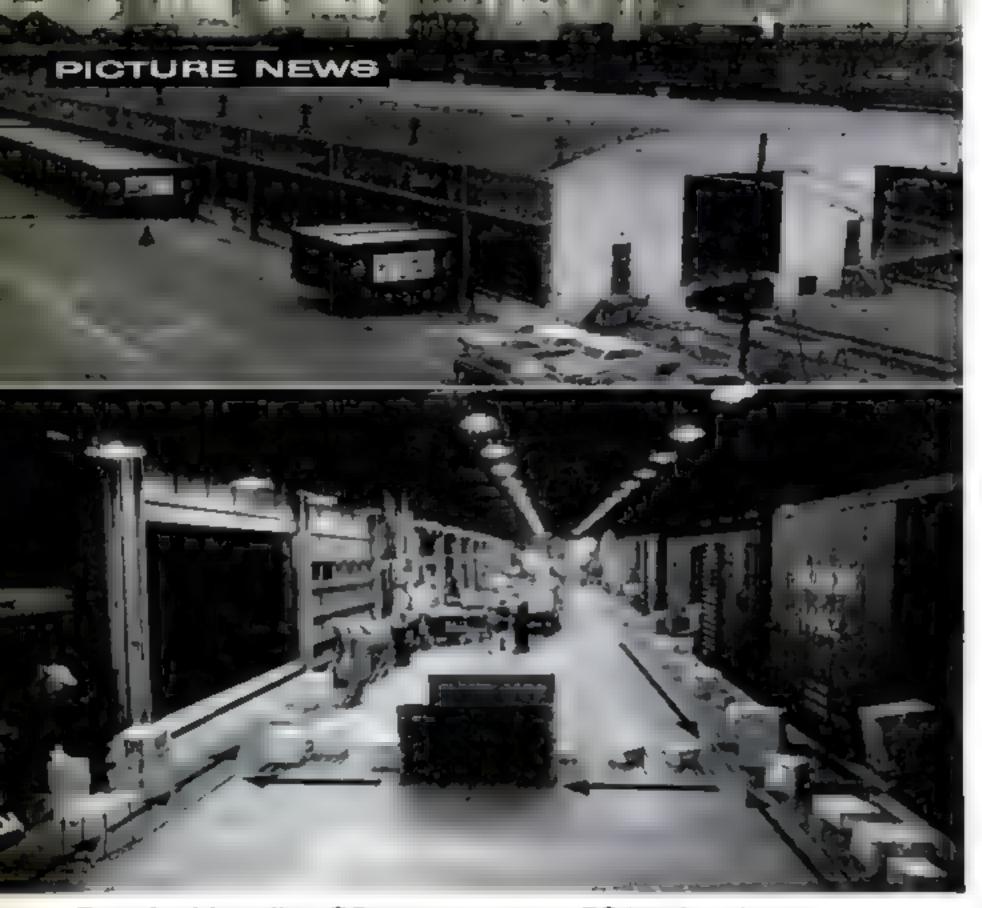


underside of the cantilever roof. At top, R. L. Cardinell, member of the acoustical engineering firm of Lewis S. Goodfriend, Montelair, N. J., tests noise recordings in a 1-40 scale model. At right is a sample of two-inch Formglas developed by Pittsburgh-Corning for use on this jet-age job.

VTOL airliner is both helicopter and plane

This British Fairey Rotodyne takes off and lands vertically like a helicopter and cruises on fixed wings. It runs on two 3,500-hp forward-driving turboprops that also supply jet power to drive the rotor blades. Top speed is 200 m.p.h., range 400 miles. It carries 48 passengers.



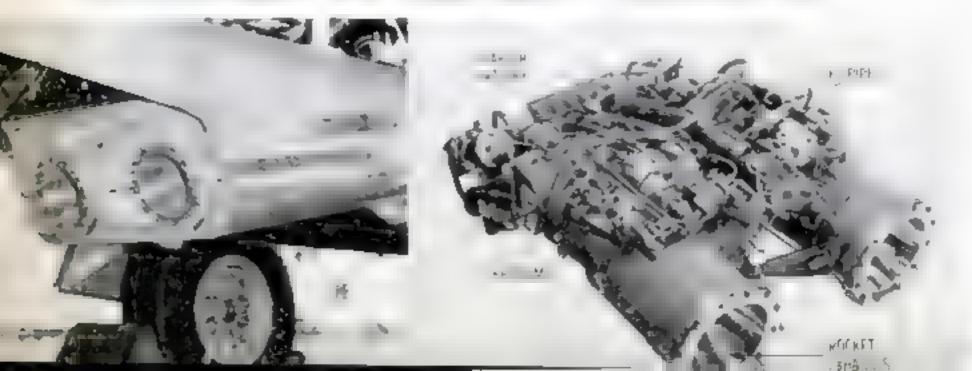


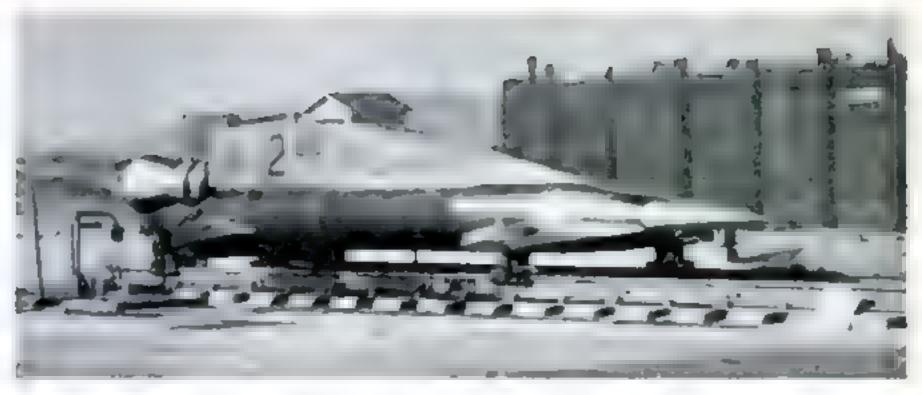
Terminal handles 30 express cars, 53 trucks at once

Power and gravity belts, rollers and moving slats—1,213 feet of them, in all—move 600,000 pieces of express a month at this new Railway Express terminal, across from the New York skyline at Hoboken. In the lower photo, packages are processed simultaneously from trucks and trains. The loading facilities can accommodate 53 trucks and 30 cars.

Twin rocket booster sends bomber to altitude record

A NAPIER Double Scorpion rocket, slung under the fuselage below, enabled a British Canberra to set the bomber altitude record at 70,000 feet. The twin booster, using high test peroxide to ignite the fuel, can be started and stopped at will. Aerojet General will make it in the U-S



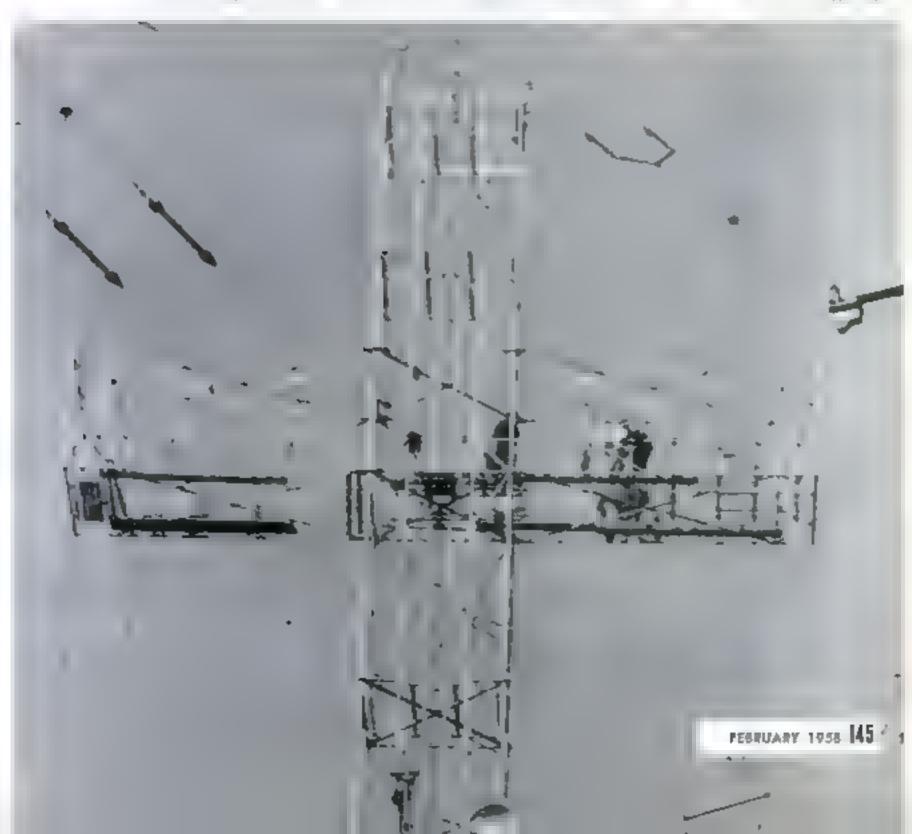


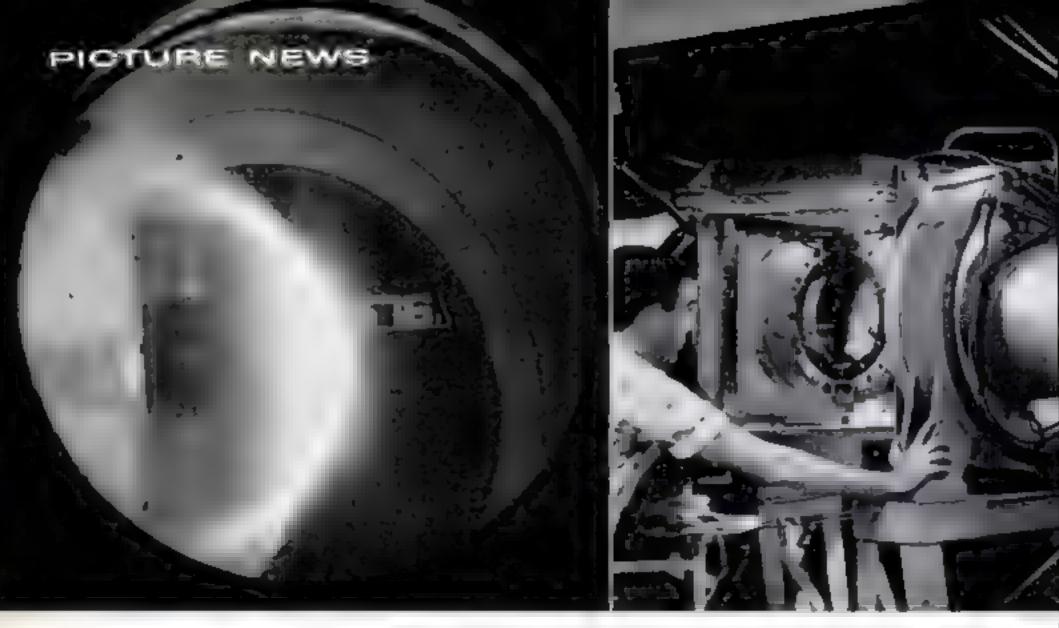
Fastest supersonic sled moves 1,500 feet per second

Ribbo the world's fastest railway, this new rocket sled at Edwards Air Force Base in California is designed to travel at 1 050 m p h. to test aircraft components at supersonic speeds. Its Rocketdyne engane develops 50,000 pounds of thrust, runs on liquid oxygen (LOX) and alcohol.

Tower of new Vatican radio is shaped like a cross

This symbolically cross shaped tower dominating the powerful new radio station operated by the Vatican will transmit the voice of the Pope to any part of the world. The antenna installation is at Santa Maria di Galeria, 11 miles north of Rome. Broadcasts are made in 40 languages.



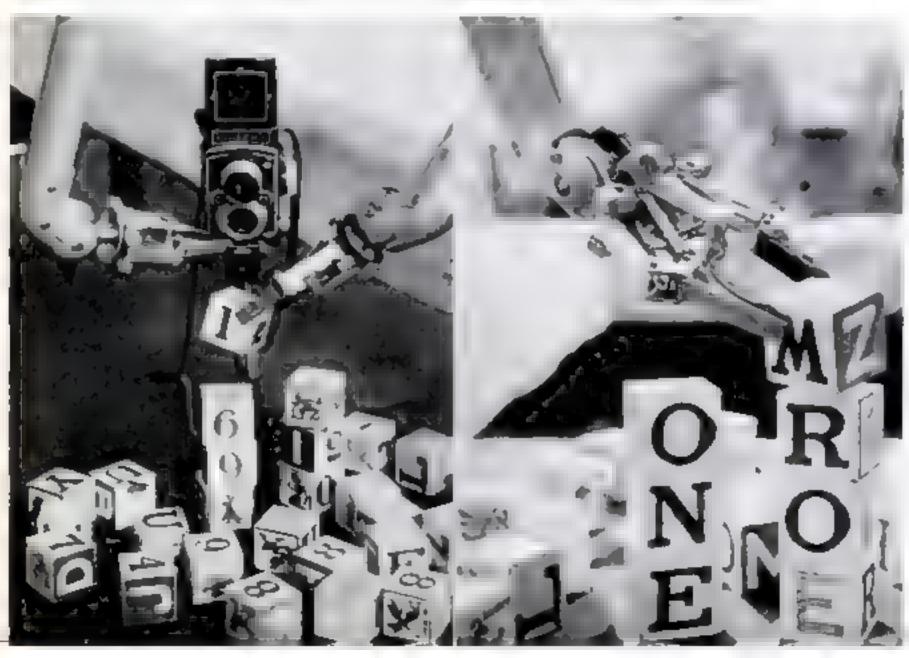


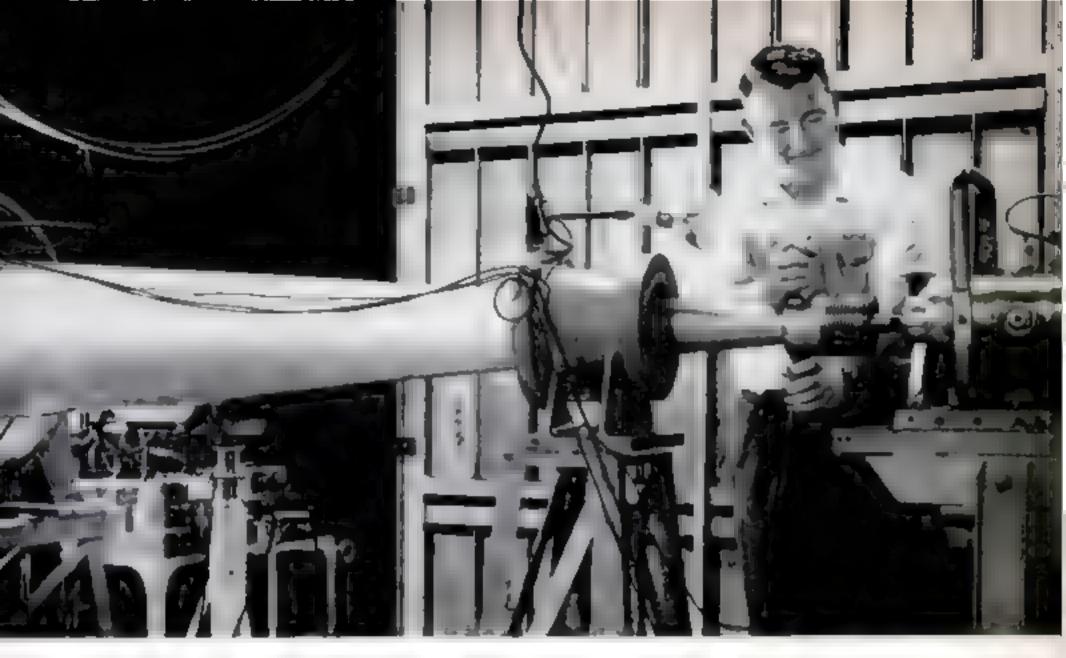
Incandescent air takes a shock picture of itself

ILLUMINATION for the photograph above, taken through a window eleft, in the "Hotshot" wind tunnel at right, was provided by the air itself flowing over a cutaway cylinder at some 16 times the speed of sound. At this far-hypersonic speed, the air developed a pressure of 20,000

Mechanical arm photographs its twin in action

A PAIR of electro-mechanical manipulators, designed for remote control of radioactive substances, demonstrate their flexibility below at the Atomic Trade Fair in New York. At left, one of the "hands" operates a camera. At right is the picture it took of the other hand stacking blocks.





pounds per square inch and attained the incandescent temperature of 10,800 degrees to simulate conditions missile materials will meet on reentering the earth's atmosphere. The picture was taken during test runs lasting from 1,100 to 1,25 of a second. The tunnel is part of the gas dynamics facility at the Air Force development center at Tullahoma, Tenn.

Electric heating elements de-ice British road

To thaw sudden ice deposits on highways, the British Director of Road Research is trying two kinds of electric heat. Here a 100-foot section is laid with heating cables carrying a 240-volt charge under the road surface. Another strip uses a grid taking 30 volts from a transformer





Gigantic faceplate made for 16-ton lathe

This faceplate for a 16-ton lathe measures almost 14 feet across. It's shown here being cleaned at the European engine-tool exhibit at Hannover, West Germany. The lathe will be shipped to India where it will be used to help make parts for industrial machine tools.



Watertight hull makes helicopter amphiblous

A REINFORCED and fiberglassed hull bottom, plus outrigger floats, adapt this Navy HUP-2 helicopter to water as well as land. The amphibious copter was converted by Edo Corp. of College Point, N.Y., for use in carrier-escort and anti-sub warfare, and for over-water ferrying.



Rolling Army plant produces LOX from thin air

BATTLE-LINE production of liquid oxygen for guided missiles is possible with the Army's new plant on wheels. The three trailer units above, built by Air Products, Inc., liquely oxygen from air with diesel-run compressors. The plant will make 20 tons of LOX in a 24-hour day.



Camera takes swivel-neck view inside new Chrysler

Here's what you'd see from the driver's seat of a new Chrysler if you could swing your neck around like a movie-cartoon ostrich Distortion in this photo—taken by a special camera with rotating

Development home comes with basement pool

Now you can buy a house with a built in basement swimming pool Eden Roc Homes in Smithtown, N.Y., has them with the swimming pool optional \$20,000 to \$25,000 without, \$800 or more extra with the pool Features include a mirror wall, picture window, 22 ceiling sun lamps.

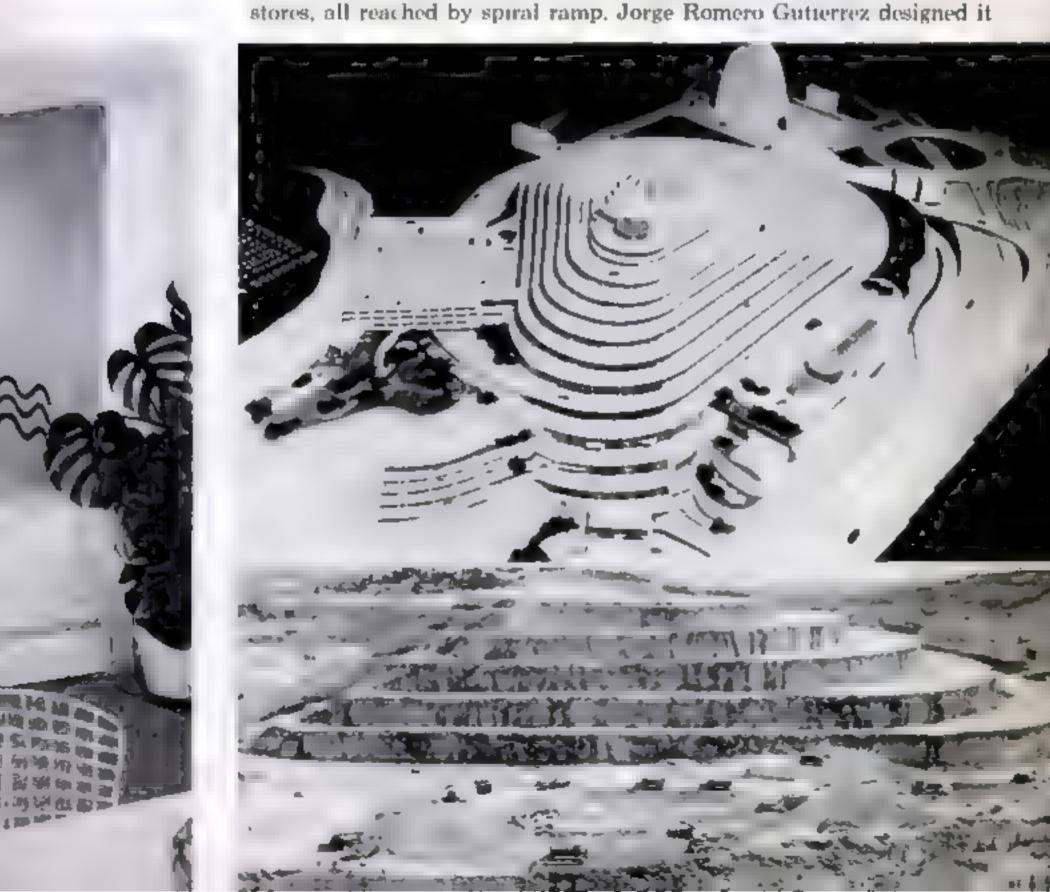




gear—is minimized if you curve the magazine into a semicircle and hold it close to your eyes. The scenery shown here, from left to right: Windsor, Canada, Detroit across Detroit River (windshield); MacArthur Bridge (right window), Belle Isle (rear); and back to Windsor

Spiral-pyramid business center is carved in mountain

ON A 365-foot mountain overlooking Caracas, Venezuela, a "helicoid" business center is now underway (shown below in model and in making). It will provide showrooms, offices, garages, hotel, swimming pool and 320 stores, all reached by spiral ramp. Jorge Romero Gutterrez designed it





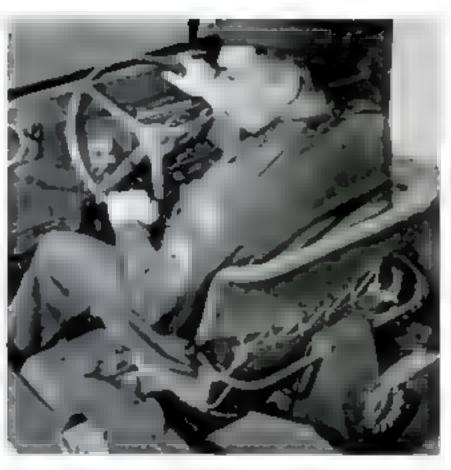
This factory went up fast—it's built on balloons

This aluminum-dome factory, the first to be constructed on balloons, was built at Abilene, Kan., by 28 men in 22 hours. Two nylon balloons, one atop the other on a 145-foot concrete slab, were blown up one at a time, and Kaiser diamond-shaped panels were assembled on them as the balloons were filled. The factory, 50 feet high, will make conveyors.



She controls phone's volume

A KNURLED knob within finger reach on the new German telephone receiver above controls a small amplifier. The listener can turn volume at his end up or down.

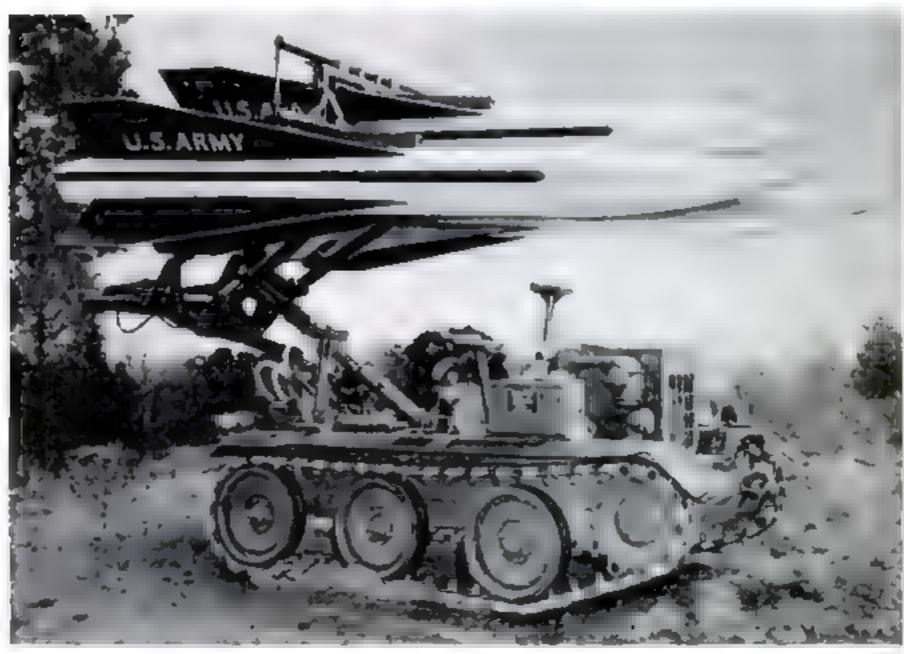


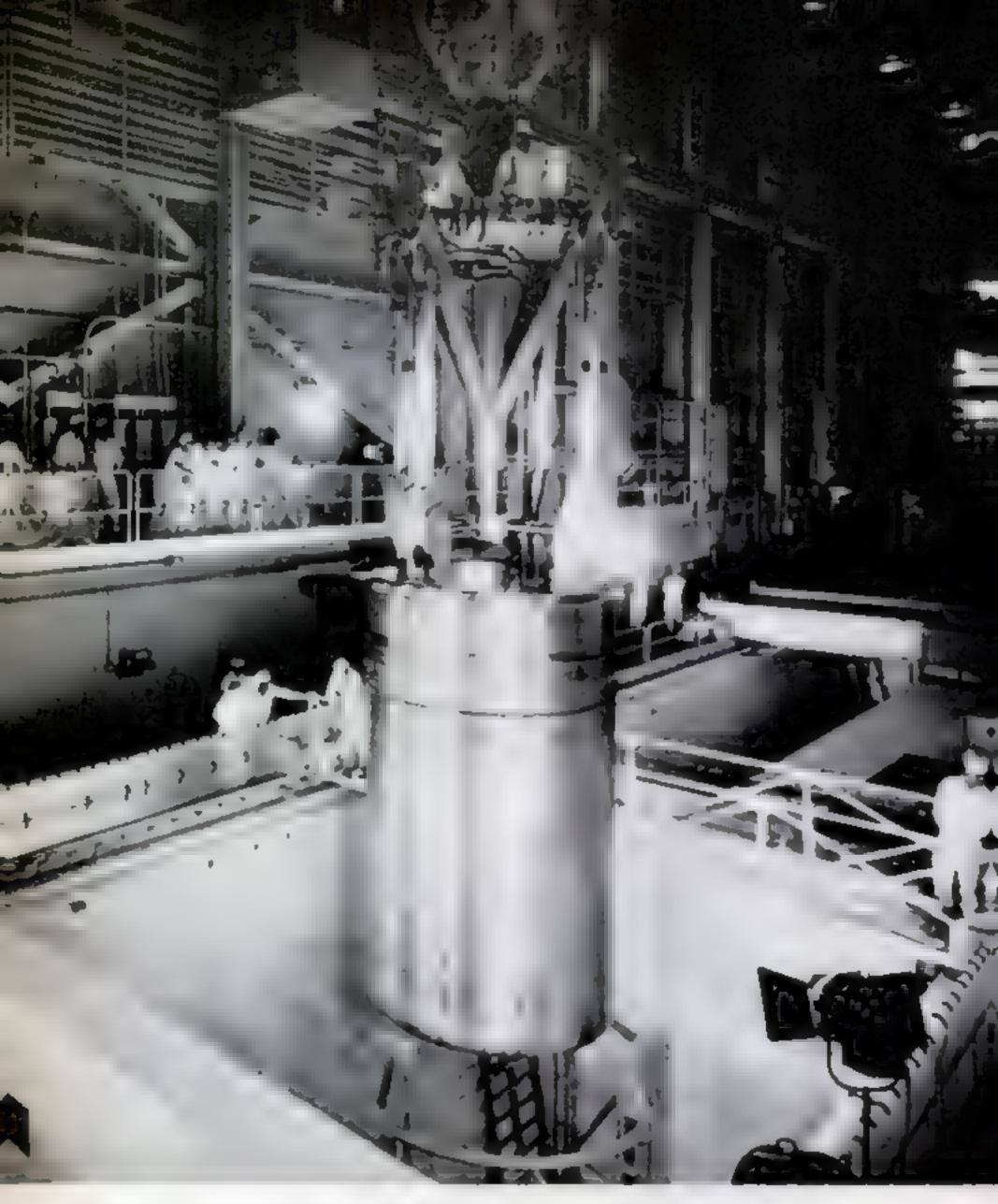
Seat takes jolt out of jeep

This canvas seat on an aluminum frame has rubber springs and drawstring adjustment for easy riding. Bostrom Mfg. Co., Milwaukee, makes it for Detroit Arsenal.

Triple loader rushes Hawk missiles to firing line

THE tractor-driven missile loader below is the Army's newest method of transferring deadly Hawk ground-to-air rockets quickly from storage to launcher. Self-propelled and highly maneuverable, the loader travels equally well over muddy or rough ground. Each will carry three "birds."





First full-scale atomic power plant gets nuclear fuel

HERE the nuclear core of the nation's first full-scale atomic power plant is lowered into position at the Duquesne Light Co's electric power plant at Shippingport, Pa. The big cylinder contains 14 tons of natural uranium and an additional 165 pounds of highly enriched uranium. All technicians engaged in the project are garbed in surgically clean clothing.

54 POPULAR SCIENCE



He boils electrons out of metal to turn heat into electricity

This "thermionic converter" makes electricity from heat in a new way, and gets eight percent of work from applied heat—compared with a thermocouple's one-percent return. GE physicist Volney C. Wilson, shown with the device above, expects to get up to 30 percent and to electrify more than the bulb at right.

Electrons are boiled out of a white-hot metal electrode and sent through an ionized tube to a cold electrode, producing current. The principle may lead to major new sources of electricity—from sunlight or from the heat of nuclear fission.



Biggest Boom

Electronic organs-easiest to play of all major instruments-are

By Robert Gorman

O CELEBRATE his 79th birthday, a retired railroad man in Wichita, Kan., treated himself to an electronic organ. A few weeks later, though he had never played an instrument before, he was giving recitals for friends.

"I had so much time on my hands that I kind of wore out my other hobbies," he explained, "So I took up a new one."

With minor variations, this is the theme song of a new march of music that has no parallel in the history of sound. The zooming popularity of electronic organs is partly measured by a more than aixfold sales increase in four years—from 16,000 units in 1953 to an estimated 100,000 last year.

The oddest thing about the boom is that—by traditional standards—most organs are bought by the "wrong" people. That is, the majority of purchasers are older folks with little or no musical background.

This is in contrast to the long-term pattern of keyboard sales. Trade analysts point out, for example, that eight out of 10 pianos are bought either for children or for adults with previous training.

Who plays? Recent surveys have filled in a few other details about the new organists. Their average age is about 40, and women slightly outnumber men. When an organ comes into the home, more than half the family members learn to play. Most organs are bought for immediate fun rather than long-range cultural education. Though organ prices average over a thousand dollars, more than two-thirds of all purchasers have family incomes under \$7,000. Skilled workers, the largest single group, are followed closely in organ ownership by white-collar, business, and professional people. Tens of thousands of owners have banded together in clubs that combine sociability with mutual instruction and, very often, community service.

From even this sketchy data it is easy

to see the outstanding appeal of the modern electronic organ: It brings the pleasure of musical creation to people who missed the opportunity of mastering other instruments.

How and why have these various assemblies of motors, gears, vibrators and vacuum tubes been able to move in on what was once the most specialized of musical specialties? There are many contributing reasons, but the main push has undoubtedly come from the nature of the organ itself. Of all major instruments, it is the easiest to play.

That doesn't mean there aren't great variations in skill and artistry, but rather that the worst duffer can quickly learn to produce pleasant, *listenable* music.

Unlike pianos, whose tones tinkle briefly and die away, organs will sustain a aound as long as you press the key. So even when you pick out a tune note by note, the melody ripples smoothly along.

Playing an electronic organ is made easier by another characteristic that distinguishes it from other keyboard instruments: The ivories are electric switches, not levers controlling hammers or picks. That means the sound isn't affected by uneven fingering. You don't have to vary your touch to add expression to music; you merely adjust a volume control with your knee or foot.

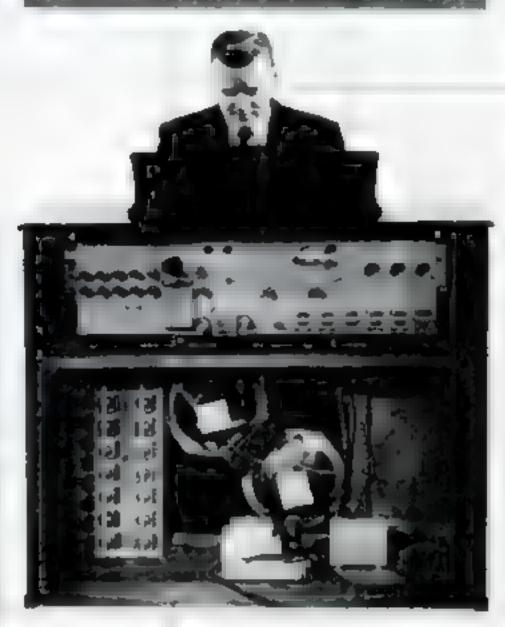
These easy-play advantages are common to most electronic organs. Manufacturers and music publishers have made the most of them by devising various kinds of "picture music," "pointer systems," and other learn-at-home scores. One company proudly advertises to organ dealers that its home-instruction course is "not approved by old die-hard music teachers." It is designed, boasts the ad, "to sell the prospect, not make a musician out of him."

A giant step toward play-it-yourself music for everybody was taken a few years ago when the Hammond Organ Company—first and still largest in the industry—introduced the first chord organ. More recently, chord organs have

in Music

zooming in popularity





also been brought out by Wurlitzer and Thomas.

As its name suggests, this trim, lowpriced newcomer makes the playing of chords all but automatic. To sound the three or four notes of a chord, you have only to press a clearly marked button with one finger of your left hand. This combination of one-finger chords, and the sustained organ tone that lets you pick out a flowing melody with one finger of the right hand, shatters the last barrier between buying an instrument and learning to play it.

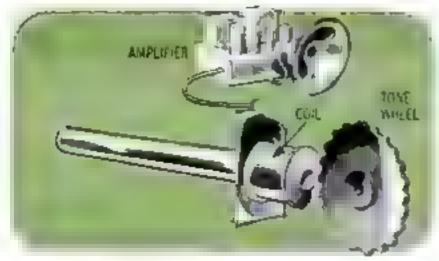
In organ language, the "musical resources" of chord organs are relatively limited. They have fewer "voices" than other models, and less range within each voice. But for most players, the things they don't have will never be missed. Thousands of sparkling chord-organ performances by concert and recording artists give evidence of their musical range.

The abundant variety possible in these babies of the organ world is indicative of the range of the larger, non-chord models: On most of them there is no practical limit to the musical sounds and special effects you can produce.

What kind of instruments are organs? How do they work? A dozen manufacturers now offer several times that number of models. These differ from each other in size, power, tone quality, and versatility as well as in their operating principles.

Electric or electronic? In order to dis-

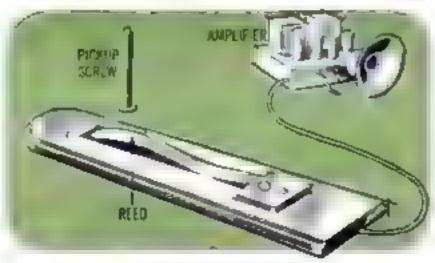
How they get their sound: These four types



ELECTROMAGNETIC

STEEL disks—or tone wheels—are the basic mechanism of all non-chord Hammonds. Motor-driven at a constant speed, each disk rotates in front of an electromagnet and induces a current in the magnet's coil. The frequency of the induced current is determined by the number of high and low spots on the rim of the disk, and each tone wheel is carefully machined to put out a pure fundamental, or sine wave. Standard models have 91 disks—61 tuned to the notes of a five-octave keyboard, plus 80 pedal and harmonic tones All disks are constantly in motion, and thus constantly generating their fixed frequencies.

Voicing, or tone coloration, is controlled by Hammond's unique "drawbars." These are nine alide switches that mix the fundamental and eight harmonically related frequencies, and adjust the signal intensity of each. Since each drawbar has eight position settings, any note on the keyboard can be colored in thousands of different ways. Pressing a key sends its tone-colored note to phono-type amplifier and loudspeakers.



ELECTROSTATIC

THE vibrating reeds that generate tones in standard Wurlitzers are similar to those in older reed organs. However, a blower keeps all reeds vibrating all the time, and thus eliminates the time lag characteristic of individually blown reeds. Also, these brass reeds are enclosed in boxes to muffle their hum. What you hear are amplified signals, not the reeds themselves.

Each of the 73 brass reeds in the sixoctave system is cut for the specific resonant
frequency at which it will tend to vibrate
once it is set in motion by the fan. Pickup
screws are mounted near the free end of each
reed. When small DC voltages are applied
to a reed and pickup, they become, in effect,
the plates of a variable condenser whose
capacity changes at a rate corresponding to
the reed's frequency. This produces an aiternating voltage of the same pitch.

The voice or coloring of a note is affected by the type of pickup (which is why some reeds have more than one); in addition, "stop-tablet" switches on the console provide

combinations of harmonics.

cuss the basic types, it is useful to distinguish between the two. Actually, both are electronic since both use vacuum-tube amplifiers to boost tone signals so they can be heard through loudspeakers. For greater clarity, however, the term electronic organ is often reserved for those models that use vacuum-tube (or transistor) circuits not only to amplify signals, but also to generate them. This category includes all chord organs and all but three of the many non-chord varieties.

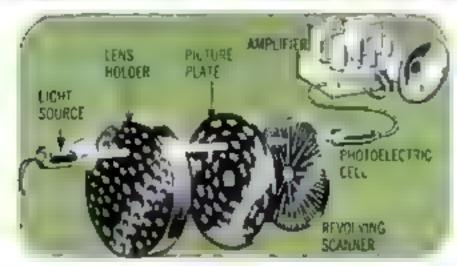
The three electric—or, if you prefer, electromechanical—organs use distinctly different systems of tone generation (see diagrams above). The famous Hammond organ produces sounds electromagnetically; Wurlitzer's so-called reed organ is actually electrostatic. The third, or photo-

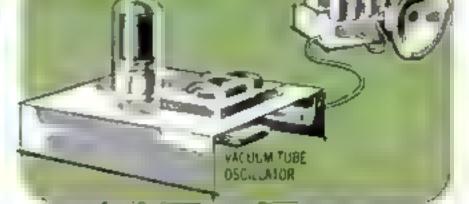
electric, system illustrated should be available shortly in the new Kimball organ.

Whether they work mechanically, electrically or electronically, organ generators produce signal voltages. Each signal—selected by a key or pedal switch—corresponds in frequency to a particular note. Frequency, or pitch, is the characteristic that determines the place of any sound in the musical scale. Thus if a plucked string sets up air waves that vibrate at a frequency of 262 cycles a second, you call the resulting sound middle C; a 622-cycle wave is D-sharp in the octave above. Every note has its own frequency. It is the same whether that note be played on a piano or a flute.

Yet obviously a piano note sounds different from the same one played on a

of generators create most organ tones





AMPLIFIER

PHOTOELECTRIC

THE optical sound track on movie film is a close cousin of the photoelectric tone generator in the new Kimball organ. Standard models will have 12 generators, each providing a different voice.

A "picture plate" in each unit has outlines of five octaves, or 61 separate notes. When a key is pressed, a selected light shines through the appropriate "tone picture," and a lens focuses it on a revolving scanner. The scanner analyzes the beam and relays its distinctive characteristics to a photocell that

A claimed advantage of this system is that it generates completely voiced organ notes—not clusters of fundamentals and harmonics that must then be combined by other circuits. And the tone pictures are said to be the exact copies (in optical recordings) of real organ sounds.

For a custom installation, it actually would be possible to "photograph" the notes of any of the world's great organs, then make up a composite instrument containing a dozen or more selected voices of your choice.

ELECTRONIC

VACUUM-TURE (or transistor) oscillators furnish the signals that make sounds in all chord organs as well as in standard units made by Allen, Baldwin, Conn, Estey, Low-rey, Thomas and others.

Individually, electronic oscillators are simple circuits—Morse-code-practicing young-sters have been building them for several generations. But an electronic organ has several rows—or several dozen rows—of them, each designed to squeal at a selected frequency.

Design differences among electronic organs are partly reflected by an enormous price range, running from about \$700 for the simplest home model to \$30,000 or more for some auditorium installations. There are also many technical differences among organs of comparable price.

Some designers, for example, prefer to create pure sine waves, then synthesize instrument voices by combining fundamentals and harmonics. Others design organs to generate signals rich in harmonics, then filter out the ones that aren't wanted.

flute. The difference is that a flute speaks in a fairly "pure" voice while string sounds are rich in harmonics. These harmonics, or overtones, are related-frequency vibrations—that is, fractions or multiples that blend with the fundamental frequency to form the total sound.

Every instrument has a distinctive pattern of resonant frequencies (called a "formant") that gives it its unique voice. Since an organ imitates many different instruments, it must have some means of recreating the proper formant of each one. This can be done in several ways.

In some organs individual generators put out pure tones which are then combined in varying proportions to simulate a desired resonant pattern. Others start by generating complex, harmonic-rich waves, then pass them through filters that emphasize some harmonics and diminish others. The variety of voices available in any organ depends partly on the type of combining circuits employed, and partly on the number of independent tone generators. For all practical purposes, however, electric and electronic systems can simulate any "authentic" organ voice—and quite a few others.

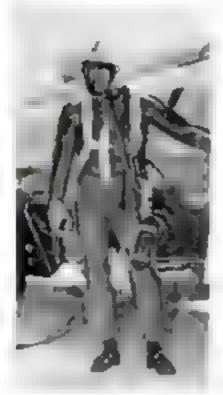
What are these voices? How and why are they chosen? Most of them derive, by a roundabout path, from thousand-year-old pipe-organ traditions.

Essentially, a pipe organ consists of a bellows (or wind chest), a set of pipes, and an assortment of slides and levers that open and close gates between the

[Continued on page 244]

The fastest man alive describes his sensations while setting the world's speed record in a rocket plane:

I Flew 1,900



Early in the morning of Monday, July 23, 1966, Lt. Col. Frank K. Everest Jr. (left) climbed into the cockpit of a Ball X-2 rocket plans. His goal: a apaed never before attained by man-three times that of sound. This story of Everest's epoch-making flight, from takeoff to landing, is from his book "The Fastest Man Alive," to be published inter this month by E. P. Dutton & Co., New York.

By Lt. Col. Frank K. Everest Jr. as told to John Guenther

HE purpose of the ninth powered flight of the Bell X-2 rocket plane was to expand the speed/altitude envelope to a point approaching Mach 3. This would be faster than man had ever flown before. We were shooting for three times the speed of sound, which is nearly 2,300 miles an hour at sea level. Of course, my true air speed would not be that high where I was flying, as the speed of sound decreases with altitude.

I was well aware of what I was getting into. Before this flight, as on previous tests, I had flown the GEDA machine, a Goodyear electronic digital analyzer, which could predict actual flight conditions based on the information we gave it. We had fed in the various stability parameters at anticipated Mach numbers, and had noted that under certain conditions the airplane would "uncork" and go out of control.

For example, if I pulsed the ailerons too much—moved them too far—at the higher Mach numbers, the X-2 would become uncontrollable. Or if I made too tight a turn

at high speeds, GEDA would show me going out of control. The high-speed flight station at Edwards Air Force Base, which furnished us much of the advice and guidance on X-2 instrumentation, had extrapolated previous flight data and forecast the stability limits of the airplane. They told me frankly what the dangers were on future flights. I followed directions and that is why I am here today.

Preparation for the flight began on Sunday. The water alcohol was cooled to zero degrees Fahrenheit in order to condense it and get the maximum fuel load on board. The Bell ground crew and technicians completed preflight inspection of the aircraft and engine, after which NACA personnel installed high-speed flight instrumentation and established zeroes. New batteries were installed and then the X-2 was mated to its B-50 mother ship in preparation for a dawn takeoff the following morning.

Instrumentation included pressure pickups for the rocket chambers, the fuel and
LOX tanks, the intake and exit ports of
the gas generator, and the intake and exhaust for the turbine pump. Strain-gauge
pickups were installed on the rudder, ailerons and stabilizer to measure the forces
that I would apply to these control surfaces. We also installed position pickups
on the control stick, rudder and control
surfaces to determine the position of all
controls and their surfaces at all times
during the flight.

A yaw meter would measure the degree of yaw of the airplane in flight. Another instrument measured the angle of attack. Roll-and-bank and acceleration instruments gave us a record of acceleration in all directions—fore and aft, lateral and longitudinal. The X-2 also carried a radio transmitter that I would use to report my progress verbally.

Because I expected to run into highspeed heating on this flight, we had installed surface-temperature pickup gauges

M. P. H.

DROPPED FROM B-50 BOMBER at 30,000 feet, the X-2 falls free, streaming flery vapor from its twinchambered rocket engine. The X-2 holds two world's records for piloted aircraft: speed and altitude.



to measure the air-friction temperatures. We had also painted the airplane with stripes of heat-resistant paint. They were of various bright colors, each color designed to withstand a specific temperature before it melted, and the nose and leading edges of the X-2 looked like a rambow. As each color melted and started to run, we could estimate the approximate temperature encountered on that part of the airplane.

A radar homing beacon was installed to enable the NACA-calibrated radar station at the main base to follow my flight. Both NACA and Air Force radar would track me, giving my speed and altitude as a check against my flight instruments.

At four a.m. on the flight line at South Base Monday morning, Jimmy Dunn, the X-2 crew chief, signaled his ground crew to begin pumping six tons of water alcohol and liquid oxygen into the waiting rocket ship. Working in predawn darkness, the sleepy men moved silently about the airplane, making it ready for another assault against space.

It was five a.m. when the alarm clock roused me from my sleep. The first light of morning was creeping above the eastern desert, and looking out the window to check the weather, I saw with concern that the sky was overcast. The X-2 did not have all-weather capabilities, and I could not attempt a deadstick landing through clouds. I had built myself up mentally in preparation for this flight and did not relish canceling it.

I immediately telephoned the weather

officer at the base for a prediction of cloud cover at takeoff time. He forecast threeto four-tenths cover at seven a.m., which would not be a problem.

For breakfast I had an eggnog and a piece of toast. I was not hungry and couldn't eat more. After breakfast I went in to see the children but they were still asleep. Avis came out on the porch with me and I kissed her goodbye. "Wish me luck," I said. She was under the same pressure I was, and both of us were a little tense. She clung to me a moment, then straightened up, smiling. "I wish you all the luck and love in the world," she said.

I drove to the flight line to check on the airplane, then continued to my office to dress for the flight. The other pilots were already there waiting for me—Capt. Fulton, the B-50 pilot, and the three chase pilots, Maj. Childs, Capt. Apt, and Capt. Kincheloe, Capt. Wray had my pressure suit laid out and helped me put it on. I studied my preflight check list a few minutes, then drove back to the flight line for a 6:30 takeoff.

Takeoff was delayed about 15 minutes so I stood around with the other pilots and the Bell people, talking and watching them finish fueling. I talked to Bob Lapp and Jimmy Dunn about the airplane. But mostly we just stood around and waited, kidding back and forth. There was more than the usual amount of tension in the air and we were all trying not to show it.

At 6:45 Jimmy Powell called the B-50 crew to board the aircraft and activity began to increase. I zipped up my pres-

"The X-2 leaped forward, eating air, and I knew at once

sure suit and put my heavy flying suit on over it. One last handshake with the men remaining behind, and I got in the B-50.

We taxied out and received tower clearance, and less than a minute later were airborne. After gear and flaps came up I went back in the B-50 and sat down near the X-2's control panel with Bill Fleming, the Bell panel engineer. Capt. Wray helped me adjust my pressure helmet and strapped it down. Then he connected my bail-out bottle to the pressure suit and strapped on my parachute. I took a last



CLOSE-UP OF WORLD'S FASTEST PLANE, the Bell X-2 rocket ship that traveled nearly 2,000 m.p.h. It was built of K-monel metal and stainless steel. Its engine developed 100,000 horsepower.

look around the bomb bay and entered the X-2.

Wray and Ernie Kreutinger, the Bell top-off man in the B-50, followed me down and helped strap me in the cockpit. After I was strapped in and connected to the oxygen and radio outlets, I checked in over the radio with Fulton in the B-50 and Jummy Powell on the ground. The radio checked okay and I went to the other items on my preflight check list—turning on the circuit breakers. checking hydraulic pressures and flight controls, turning on my oxygen system.

Sunlight was now flooding the B-50 and the X-2 as we climbed laboriously upward, circling alowly in a heavy spiral that would take us to drop altitude six miles above the ground. But below us daylight had not yet reached the desert where the little cavalcade of vehicles moved in semidarkness across the lake bed to take up its position at the south end of the lake. It moved slowly through the main gate, the radio truck leading the way, followed by eight or nine other vehicles carrying the 50-odd men and women who would follow the news of my flight and meet me when I landed. Silently now, listening for any word from the B-50, they regrouped themselves half a mile off the landing strip and waited.

Up in the X-2, Wray and Kreutinger carefully slid the heavy canopy into position and I locked it from the inside, sealing the cockpit against the outside world until I was once more back on earth. Despite myself, I felt a pang of loneliness and isolation when they climbed back into the B-50 and moved out of sight

in the bomber

We were above the clouds now, still climbing, but the overcast had increased. Weather reported by radio that cloud cover was four- to eight-tenths overcast. But looking out of the cockpit, I could see the desert through occasional holes in the clouds and told myself I could pick up a landmark and land safely.

Our course was east, to where I would drop in a westerly direction. On rocket burn-out I should be above Bakersfield. Cal., in position to turn and glide back to a landing. Cloud cover was now seventenths overcast and altitude 33,000 feet. With its heavy load, the B-50 would not go any higher. Capt. Fulton nosed over to pick up speed for the drop and his dive carried him 2,800 feet toward the ground. At 7:45 a.m. he tripped the lever that released the bomb shackles in the big bomber. The X-2 fell free in the morning light.

My gloved fingers depressed the locking button on the throttle as I fell and locked it in full-power position. With a force that slammed me back against the cockpit wall, both rocket chambers roared into life and the fiery energy thrust the falling airplane forward. Shaking my head

I could not hold it down . . . It hungered for the whole sky"

to clear it from the shock of the sudden acceleration, I pulled the wheel slowly back toward my pounding heart and be-

gan the familiar climb upward.

The X-2 leaped forward convulsively, eating air, and I knew at once that I could not hold it down. Today it hungered for the whole sky. This appetite for speed was ravenous and would not be denied. Again I attempted to keep a predetermined climb schedule, and again the airplane was running away from me. Fighting the controls, struggling to hold a steady flight path, at 50,000 feet I was already supersonic. Very carefully now, afraid of overcontrolling, I began the familiar push-over toward level flight.

Automatically I discounted the time lag in my altimeter and Machmeter. My instruments could not keep up with the fantastic acceleration. Altitude was 50,000 feet indicated, 55,000 true. Rounding out now, I would be straight and level at 60,000 feet indicated, true 65,000.

All the instruments were lagging. I held the control stick with both hands, still pushing forward. My senses were extremely acute and drawn to one point in time, luminous and aware and waiting for the unknown to happen. In my hands I held the reins of 100,000 horses.

Level—now. Ready—now. The airplane accelerated on up and I watched the Machmeter climb to a speed I knew had never before been flown by man. I observed some debris coming over the nose of the plane and hitting the windshield. Worry now, until I thought of paint blistering and coming back over the cockpit. This was the heat barrier.

But I had no time to think about it. I was too busy flying. The airplane handled beautifully. Still in level flight, it continued to drift on upward, hurled skyward by the incredible momentum of its climb. Speed was over 1,900 miles an hour. I felt like an explorer, like Columbus and Magellan. I was both awed and proud.

Except for the hiss of air over the cockpit and the far-off creckle of static over my radio headset, I heard nothing. I was acutely conscious of absolute stillness and calm, a solutary world in which I was suspended, alone in time and space.

Aided by its modified fuel probes, the rocket engine burned four seconds longer

than ever before, then sucked the tanks bone dry of fuel and burned out.

I pulsed the ailerons to the left, to the right, then did a stabilizer pulse to the positive position. I could detect very little yaw tendency, but I noted a definite decay in lateral stability. When I released aileron pressure and returned the controls to neutral, the airplane continued rolling in the direction of the control movement, and I had to apply opposite control to stop the roll.

By pulsing the controls, I mean maneuvering, a movement of the stick. If I pulsed the ailerons too far, I knew from the GEDA machine that the X-2 might

not stop rolling.

hoped to reach.

For this reason, I pulsed the stick very gently, just an inch or two sideways, then returned it immediately to neutral to observe the reaction of the airplane. I pulsed it to the left again, then to the right. Then an inch or two in the rearward position. I noted that the airplane was still controllable and I felt it could be flown safely at these speeds or a little faster. However, control was marginal, and if the pilot maneuvered too violently, anything could happen.

When I finally broke radio silence I said one word, "Bingo!" Unless I reported in code, which I forgot to do in my excitement, that was all I could say in the open. But to the listeners many miles below me, it said what they were waiting to hear. This was it—this time we had done it! They knew then that I had approached the higher Mach numbers we

Glancing quickly out of the cockpit at the toy landscape far below me, I tried to identify my position over the California desert. I reported to my chase pilots and asked if they had me in sight they did not. Without the exhaust from my rocket engine, they no longer had the

guide by which they tracked me.

Giving them what I thought was my position over Bakersfield, I made a right turn back toward Edwards and began my letdown. Speed was still supersonic, and again I performed aileron and stabilizer pulses to test control and stability of the airplane, being extremely careful not to overcontrol. Although engine power was

[Continued on page 238]

How We May Get H-POMER

Authentic data and photos, newly released from secrecy, present an exciting picture of the next atomic wonder: the peacetime use of controlled fusion

By Aiden P. Armagnac

HAT'S behind the headlines you see these days, like "Baby Sun To Aid H-Power Studies" and "British On Way to Use of H-Power"? They're items in the exciting story of what may be the next great advance in nuclear energy—atomic power from fusion. Here are the answers, some of which can only now be given, to the questions a layman may ask about it:

What is fusion?

It's the source of the sun's heat, and of the H-bomb's terrific power. Thermonuclear energy is another name for it.

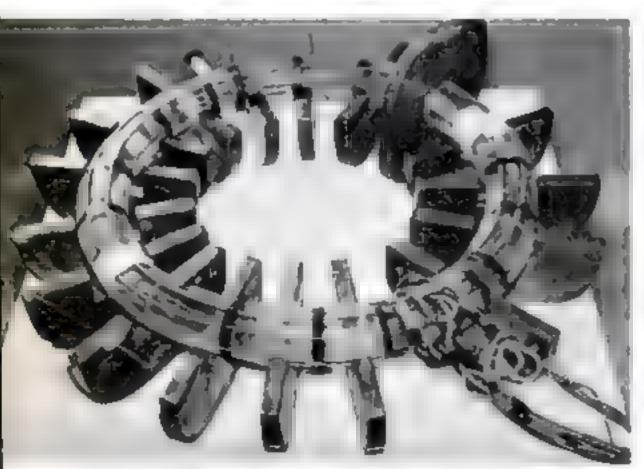
A hydrogen bomb's explosion is a fu-

sion reaction out of control. If fusion could be controlled and tamed, that awesome power could be put to peaceful and constructive use.

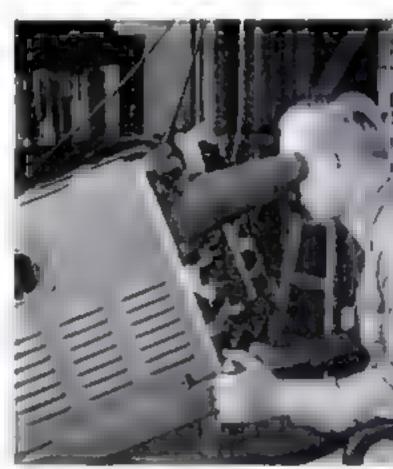
Is that at all possible?

So much progress has been made toward it that now researchers are going from toy-sized experimental models to big-scale apparatus—like the "baby sun" of the headlines, a projected multimillion-dollar U. S. machine called the Model C Stellarator.

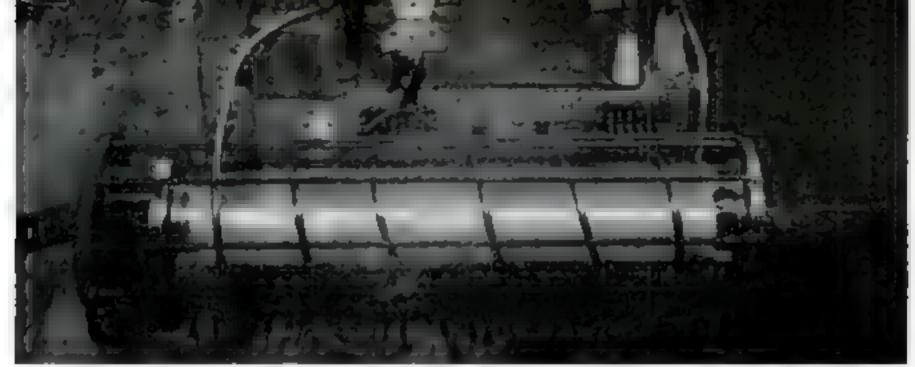
Until lately the whole business has been wrapped up in secrecy. But now the wraps have been lifted enough for a peek at what's been going on, from first principles to latest developments.



PERHAPSATRON TUBE, above, and its use to test idea of conlining super-hot reaction in magnetic bottle are shown in views now released of long-secret U.S. fusion experiments.



UNDER OBSERVER'S CONTROL, electric discharge of 12,000 amperes applies a magnetic "pinch" to the



MAGNETIC BOTTLE, named Columbus, pinches hot gas into a luminous line—and gives preview,

in miniature, of what the multimillion-degree "flame" of a fusion furnace may look like.

To begin with, what's the difference between fusion and the kind of atomic power we have already?

So far, nuclear reactors run on uranium, or plutonium, or thorium. Those fuels release their energy when the hearts of their atoms split in two. Fission is the name for it.

Fusion is just the opposite. A fusion fuel's atomic particles, instead of splitting in two, join themselves to others. That liberates even more energy than fission does, pound for pound of fuel.

What would be the fuel for fusion?

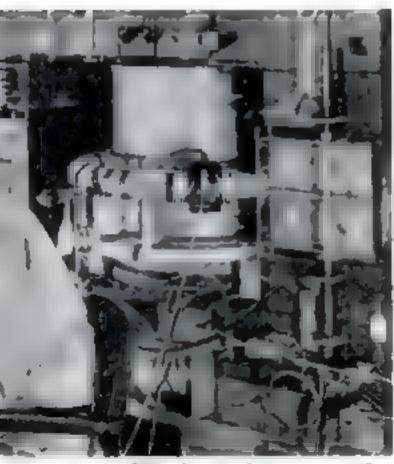
Deuterium, also called heavy hydrogen, looks like the best. When it fuses, it turns into helium, By-products are ordinary hydrogen, tritium or extra-heavy hydrogen, and many neutrons. That's the overall result of several reactions taking place at once.

Where do you get the deuterium?

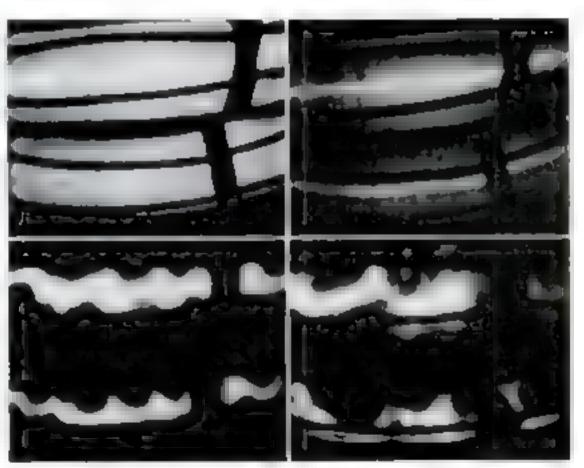
The oceans are full of it. Water—it's H₂O, you remember—contains hydrogen. And about one part in 6,000 of all natural water is beavy water, the kind whose hydrogen is heavy hydrogen.

There's enough deuterium in the seas to provide all the world's fuel for a billion years to come, at 1,000 times our present rate of energy consumption.

Is that why we want fusion power? Yes. There is only a limited amount

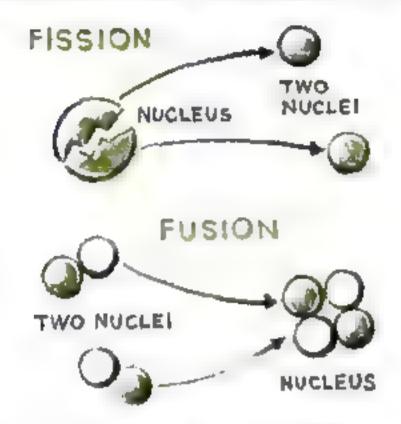


gas within the Perhapsatron tube, which has been placed at center of six-ton magnet in background.

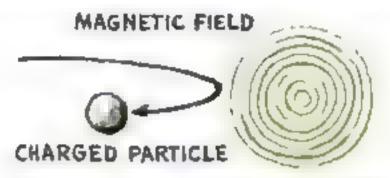


GLOW, PINCH (upper right), kinking, and pinch's breakup successively follow discharge, as seen through tube's taped-on wiring. Mirror gave twin side-and-bottom views.

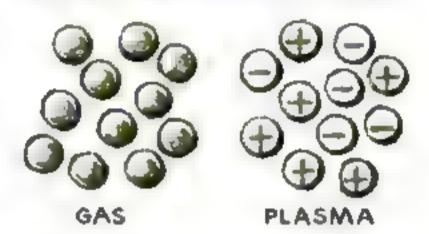
Drawings show principles of H-power, how they might be applied,



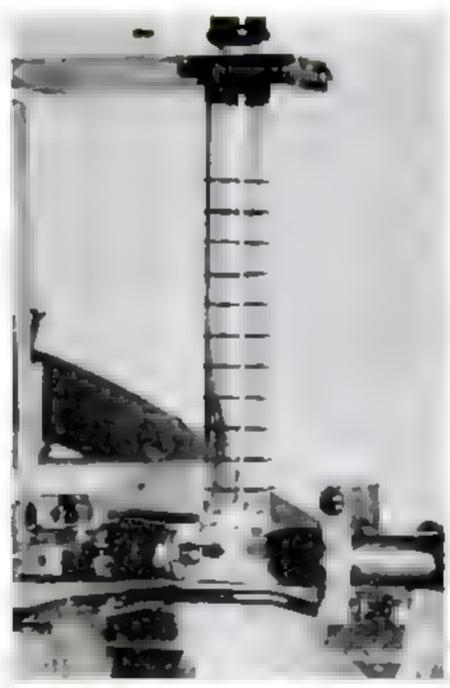
IN FISSION, which gives the kind of Apower we have now, atomic particles split in two. In fusion, they do the opposite, joining to make bigger ones.



MAGNETIC FORCE, which could confine fusion fuel, acts on gas if it is charged.



DEUTERIUM FUEL is therefore turned from ordinary gas into charged one (plasma).



ELECTRIC SHOCK TUBE magnetically drives shock wave upward, through deuterium gas in vertical section, in tests seeking gentle way to ignite fusion reaction. Modified version of tube has given 1,200,000-degree heat, by NRL estimate.

of coal, oil and uranium in the world Sooner or later we'll use them up. But the supply of deuterium is practically inexhaustible.

How do you extract the deuterium?

First you separate the heavy water by distillation, electrolysis or a newer method called chemical exchange. Then you can easily decompose the heavy water, with electric current for instance, and get the deuterium. It's a gas, just as ordinary hydrogen is.

Will deuterium be expensive?

With heavy water currently selling at \$28 a pound, deuterium by one estimate should cost about \$400 a pound. That's a bargain; it will yield 30,000,000 times as much energy as an equal weight of gasoline.

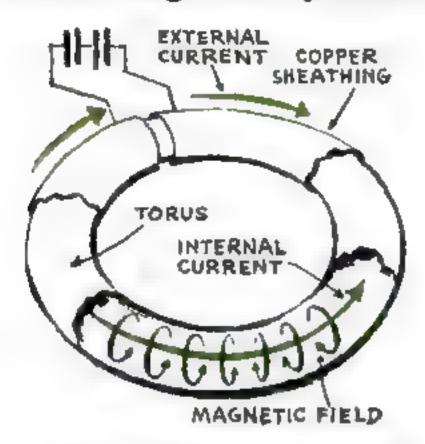
What are we waiting for, then?

There are three staggering problems to lick before we can build a fusion-power plant: how to light the fire, how to put a firebox around it, and how to extract the power.

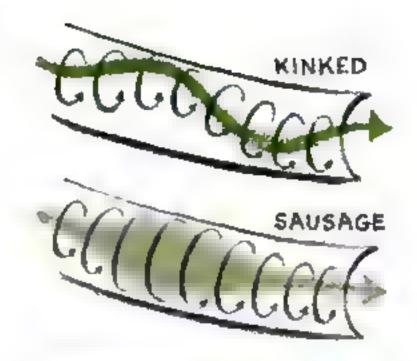
Take the first one. To kindle a self-sustaining fusion reaction in deuterium, somehow you must heat it to the astronomical temperature of 700,000,000 degrees F.

166 POPULAR SCIENCE

and some "bugs" of early schemes



SIMPLEST MAGNETIC BOTTLE is gas-filled torus (doughout-shaped tube). Current around sheath induces current in gas, to confine it by magnetic pinch effect.



"INSTABILITIES" of these three kinds plagued early magnetic-bottle experimenters. Instead of holding steady, column of hot gas wriggled, bulged or became fluted in cross section.



FLUTED

Mixing tritium with the deuterium would lower that appalling figure—but it will still take at least 180,000,000 degrees to set any kind of fusion fuel ablaze.

Can we ever manage to do it?

It's actually been done, we know, because a fusion reaction has been brought off in H-bombs. To ignite it, the H-bomb has a built-in A-bomb, which furnishes the multimillion-degree heat. But you obviously can't start a fusion-power plant with an A-bomb, so experimenters have been seeking a gentler way to reach extreme temperatures.

Now they believe that they've found the answer.

How would they do it?

By heating the gas with shock waves. In theory, at least, that could raise a gas directly to "thermonuclear temperatures."

A shock wave is a faster-than-sound wave of pressure, as from an explosion. In fact, some early fusion experimenters abroad actually exploded small "shaped" charges, and made gas so hot that it became luminous (PS, June '53).

Now it's revealed that U.S. and other fusion researchers are using a much more advanced technique, which consists of driving shock waves through a gas magnetically. The waves are propelled either along a tube or, in other setups, from the walls of a tube toward the center. Even on a small scale, results have been rather fantastic.

An "electric shock tube" is believed to have heated glowing deuterium gas to more than 1,000,000 degrees F., in fusion tests at the Naval Research Laboratory. Figures attained in trials elsewhere in the U.S. are still to be disclosed

Probably there remains a long, long way to go—but the experimenters seem confident that kindling the fusion fire won't be their hardest problem.

What's the toughest one, then?

The firebox is the prize problem. No material exists that can stand up to that kind of heat. Every known substance would vaporize instantly. So your strange task is to construct a firebox out of nothing at all.

Can there possibly be an answer to that one?

Yes—a magnetic bottle.

The idea would be to confine the superhot deuterium gas within a powerful magnetic field, while the fusion reaction took place.

The deuterium would first have been

FEBRUARY 1958 167

ionized, or charged. Passing an electric current through it, or simply heating it to the extreme temperatures at which fusion could occur, would ionize it. The resulting swarm of charged particles—the fusion workers call it a plasma—will respond to the effect of a magnetic field, although an ordinary uncharged gas would not.

Since there has to be some solid and tangible apparatus somewhere, the "magnetic bottle" actually would be a tube, filled with deuterium to start with. Then magnetic force would hold the deuterium

well away from the tube's inner walls, leaving a vacuum along them.

In magnetic-bottle experiments from which the secrecy has just been lifted, this was done by applying a curious phenomenon called the pinch effect.

What, exactly, is that?

A homely illustration of the pinch effect is what happens to a copper drain pipe when lightning hits it. The pipe crumples up as if squeezed in a giant fist. So do flat copper strips given a quarter-million-ampere jolt, in General Electric's artificial-lightning laboratory. The explanation is that the mighty current creates a powerful magnetic field; this, in turn, puts a

squeeze on the current-carrying metal.

The same thing happens to a tubeful of gas carrying a heavy current, it was first observed in 1951. The current's own magnetic field pinches the gas away from the tube's walls and toward the center. When suddenly discharged through the gas, the current whams it together, and you get shock-wave heating in the bargain.

That was the scheme of working models built to test the magnetic-bottle idea.

What did they look like?

One was an endless doughnut-shaped tube about two feet across, nicknamed the Perhapsatron, and tried out in '52-'53 at the Atomic Energy Commission's Los Alamos Scientific Laboratory. A condenser discharge of 12,000 amperes was shot through electric windings around the three-inch-diameter tubing, and that induced another current in gas within the tube. The gas glowed brightly and, within a few millionths of a second, an exciting thing happened. The glow shrank to a luminous thread along the tube's center. Magnetic force was pinching it—as they'd hoped it would.

A second magnetic bottle built by the Los Alamos team was a straight quartz tube, about a foot and a half long, called the Columbus. Through gas in this tube, a

triggered spark gap hurled more than 100,000 amperes of current, pinching the glowing gas into a luminous line down the center.

Encouraging as this looked, the trials showed there was a catch, so serious that it threatened to wreck the scheme.

What was that?

The pinch didn't last. Quicker than you could say "pshaw," the glowing thread of plasma would wriggle, kink, and break up.

A current held by its own magnetic field, it turned out had unruly ways of behaving—"instabilities." It strayed into a winding path—and then, like a meandering river, it kinked more and more. Or, when the

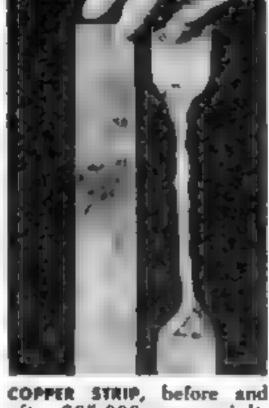
"pinch" happened to squeeze the plasma a trifle sooner in some places than others, you'd get alternate pinches and bulges like a string of sausages; and the bulges rapidly grew.

An alternate magnetic-bottle scheme, providing an external magnetic coil to confine the plasma, struck a similar snag. In this case the column of plasma, departing from a nice round cross section, took on a more and more fluted shape.



First, the pinch didn't hold steady for even the second or two that it might take to start a fusion reaction.

Worse yet, the kinks or bulges or flutings quickly reached the tube's wall—



copper strip, before and after 265,000-ampere jolt, dramatically illustrates "pinch effect." Metal is squeezed as if by giant fist.

[Continued on page 240]

New Ideas from the Inventors



1 V Plows Clear Tracks in Snow. With these recently patented wheel plows hooked to the bumper, even a light car or truck might be able to dig its way through

snow. For instead of trying to buildoze tons of snow to clear a car-wide path, the plows would merely slice out two narrow tracks for the wheels.

2 Clothesline Unreels Plns. A housewife wouldn't have to fumble with loose clothespins to hang wash on this line. Permanently—but slidably—attached to the line, pins stored inside the pulley housing would travel out with the line, go back as the line was reeled in.

3 Printed Batteries Save Space. To form dry cells on thin sheets, this inventor would orient metallic-ink particles magnetically. The proper electrochemical action could take place, he says, because each layer could be made conductive without direct layer-to-layer contact.





Please turn the page for more new ideas

More inventors' ideas



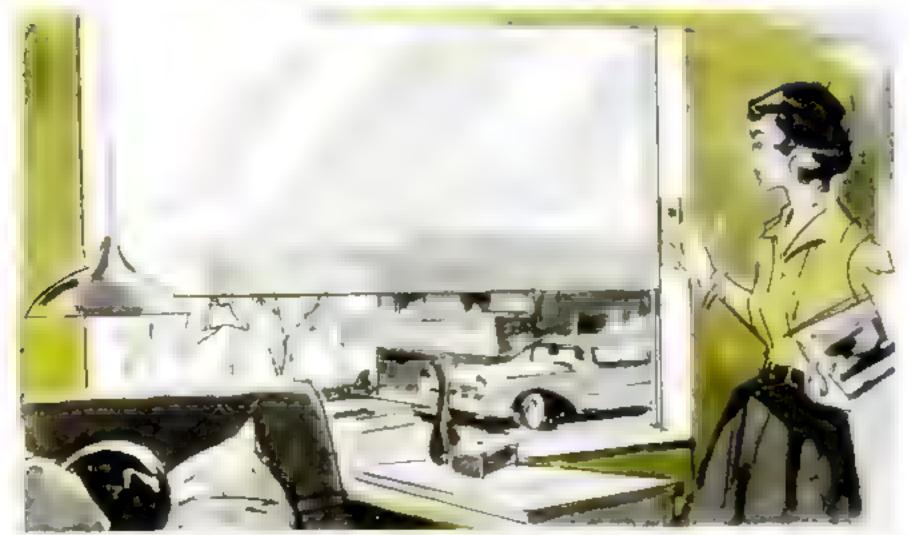
4 Plate Clip Holds Butter Knife. Buffet meals might be easier to eat if hostesses provided plate-edge clamps like those shown above. Slipped onto the rim of a dish, the clamp would provide a non-skid holder for a pat of butter and a spring gripper for the butter knife.

6 Liquid Clears Picture Window. You wouldn't have to sacrifice light for privacy with a window like this. Two sheets of translucent glass would normal-



5 Spinning Mirror Sheds Snow. Keeping a rear-view mirror whirling rapidly wouldn't affect the images it reflected, but should keep snow, sleet or rain from settling on the glass. The mirror's shaft could be battery- or wind-driven, or powered by engine vacuum.

ly admit light while blocking the view. But by pumping between the panes a liquid with the refractive index of the glass, you could make them transparent.





7 Radiation Tags Forgotten Sponge. To provide a sure and simple way of accounting for all surgical sponges used in an operation, this inventor would embed pellets of harmless radioactive material in the gauze pads. After the operation, a Geiger counter could track them down.

Collar Colls Dog's Leash. Instead of unhooking this leash when you wanted to let your dog run free, you'd just drop the end. A spring would coil the leather strip inside the collar. A sliding licensetag holder would adjust the length that could be drawn against the spring, and thus permit a quick change from a short leash to one of normal walking length.





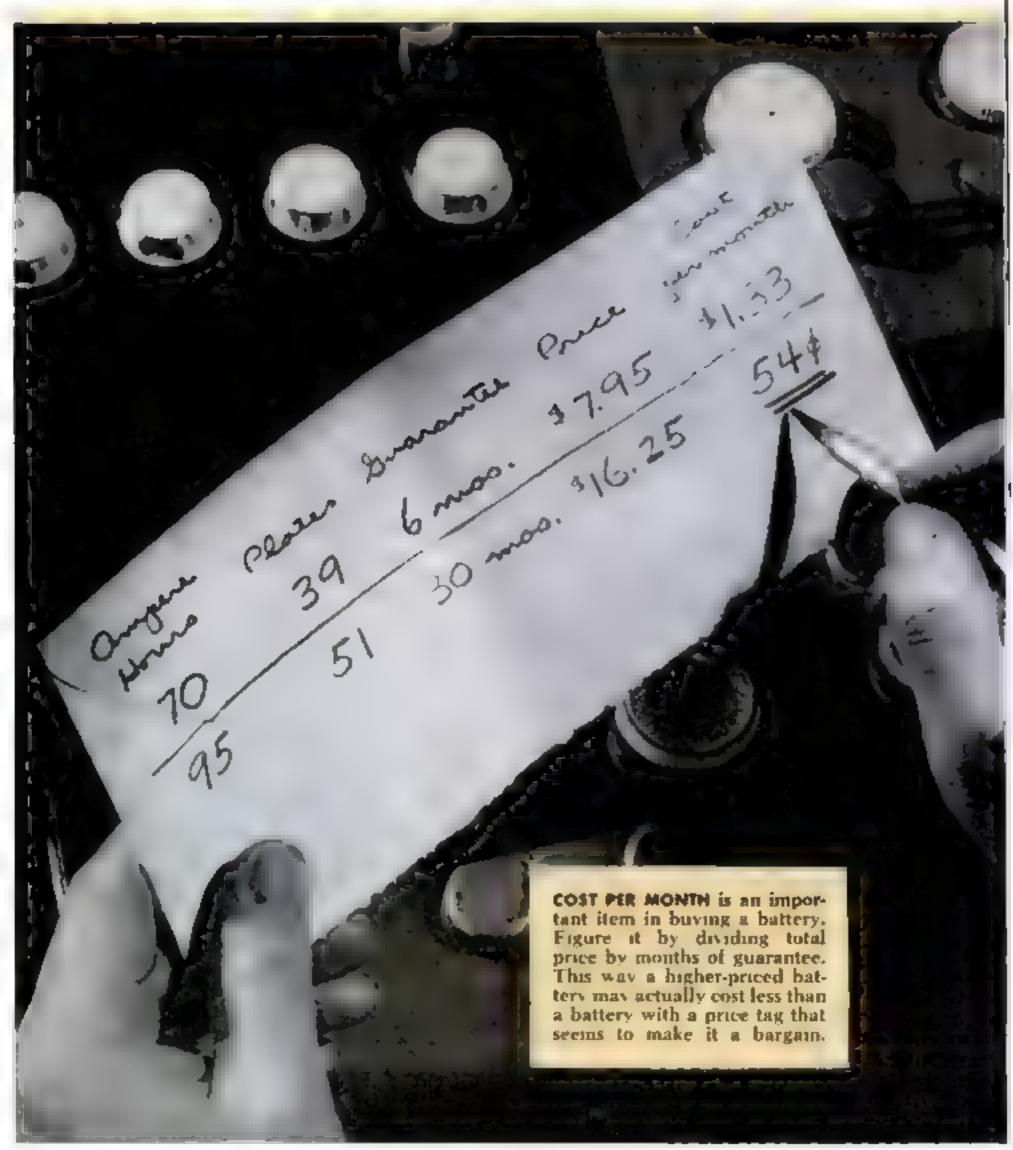
9 Hand Truck Climbs Stairs. The motor on this heavy-duty hand truck would either drive it across a floor or ramp, or lift it up a stairway step-by-step. Small rubber rollers would engage a stair tread as shown. After the driven sprockets had lifted the main wheels to stair level, the rollers would engage the next step.

The following patents have been cassed on these inventional I Patent No. 2 2:004 to 4 lafe, University Heights, Obio; 2 No. 2:586.632 to M. Espainto Glos riville, N.), 3. No. 2:688.649 to J. Sporksten Madison, N. s., 4. No. 2:739.465 to D. Soderblom, Ardmore, Okla., 5. No. 2:737.852 to G. Porter, Center Marishes N. Y., 6. No. 2:783,582 to O. Swenson, Cristal Lake, 181, 7. No. 2:140.465 to H. Riotdon, Oak Park, 181, 4. No. 2:149,345 to A. Ruggiero and C. De Ninne, New Rockelle, N. Y., 9. No. 2:740,484 to J. Montano, Glendato, Colif.

Copies of patents may be ordered, by number, from the Commissioner of Patents, I askington 25. D. C., at 25 cents each To write to an carentor, if the address given above is transferent you may address him f by name and patent number) in care of the Commissioner of Patents.

How to buy

The Right Battery for Your Car



Consume News

Do you need a new battery—or just a recharge? How much capacity does your car require? How can you figure true battery cost? Here are the facts



By Edward D. Fales Jr.

T'S late afternoon. You're in a parking lot miles from home. Your starter groans and quits.

Battery's shot," says the gas-station fellow, looking you in the eve.

"How much for a new one?" you ask.

He looks in a book. (Somehow you're always suspicious when

a dealer goes for the book.) He says: "\$37.95."

You indulge in a moment or two of verbal wrestling, but you're licked before you start and you know it. "Look," he says, "it says right here. For a 1956 Plyforlet sedan, 12 volts, 54 plates, 65 ampere hours, \$37.95,"

So you buy it and drive home. On the way you seem to remember paying \$12 for a good battery. What became of \$12

batteries? Are they still around?

Back home, you pick up a mail-order catalog. Staring you in the face is a battery with a 15-month guarantee. You suddenly remember. You drove off without your guarantee.

But what startles you is the price: in big type, \$7.75. You start to blow your top. Then you see it's a six-volt battery.

Then you see something else. This little six-volt job actually costs only \$5.75 because the buyer gets a \$2 allowance. You got no trade-in allowance at all. (You forgot to ask for it.)

Now you're wondering: Were you "taken?" Did you, in fact, need a new battery after all? Or did yours just need charging? What could you have done? Here's what:

Make sure the dealer tests the "dead" battery.

 Don't waste time looking for bargain or miracle batteries. There aren't anv.

 The battery that costs most at first may actually cost less in the long run.

Take that little \$7.75 battery. To begin with, that's factory price. Who goes to a factory to buy a battery? In a retail store it's \$8.45.

And the seller himself tells you it will cost you 52 cents a month to use—if you spread the purchase price over the 15-month guarantee time. Right next to it he advertises a huskier six-volt job for \$14.15 (factory). This one gives not 80 but 115 ampere hours; cranks at zero for 3 6 minutes. And this one has a fouryear guarantee. Cost per month (if you use it four years): only 28 cents. So the \$14.15 battery on a long-term basis actually costs. you half as much as the \$8.45 battery.

One of the big users of car batteries is the Hertz Co., which rents out more than 30,000 automobiles all over America. Hertz

How to tell whether you NEED a new battery

BEFORE you buy a new battery, you should make certain that all life has gone from the old one or is about to go. Here's how to check:



1. Test with a voltmeter. Have your serviceman prod each battery cell with a voltmeter. If the difference between the highest cell and the lowest one is .05 volts or more, the battery is nearing the end of its useful life and should be replaced.

However, if the highest cell reads less than 2.08 volts, the test should be considered doubtful. Have the battery re-

charged and repeat the test.

Here are two typical sets of test readings, illustrating good and bad conditions:

1st cell	2nd cell	3rd cell	Condition
2.07	2.06	2.06	0K
2.09	2.02	2.08	worn out

State of charge: To tell exactly how your readings rate, check them against this standard:

2.10 100% charged (excellent)

2.03 50% charged (recharge)

2.00 25% charged (bad for battery)



2. Or test with a hydrometer: Have your serviceman read the specific gravity of each cell and compare the readings. If the difference between the highest and lowest cell is .050 (50 points) or more, the battery is near the end of its life and should be replaced. If highest cell reads less than 1.190, the test is doubtful (see above) and must be repeated after recharging the battery.

Typical readings:

TANGER LABORINGS			
1st cell	2nd cell	3rd cell	Condition
1.230	1.220	1.220	undercharged but OK
1.250	1 180	1.240	worn out

State of charge: Some hydrometer scales show this directly in percentage of charge. If your serviceman's does not, compare his readings with the following:

1.260 100% charged (excellent)

1.230 75% charged (fair)

1.200 50% charged (recharge immediately)

1.170 ... 25% charged (bad; could rote battery)

1.110 . . (discharged)

174 POPULAR SCIENCE

naturally has given batteries a lot of thought. Hertz's national maintenance boss, G. H. Maxwell, says:

"The best gauge of value is cost per month. If a battery sells for \$18 and is guaranteed 18 months, the cost is \$1 a month. If a \$24 battery is guaranteed for 30 months, or a cost of 80 cents a month, it would be a far better buy . . ."

Tips: (1) Get your guarantee—in writing. (2) Register your battery immediately by sending in the date-of-purchase

slip.

And know what your guarantee is. Most big makers give you a new battery if yours is found defective in 90 days or 3,000 miles (whichever happens first).

After that, you get a cost adjustment based on "units of use." A unit may be either one month or 1,000 miles. Lowand medium-priced batteries are guaranteed for from 15 to 24 units. High-priced batteries are guaranteed for 30, 36 and even 48 units. One big seller gives a flat five-year guarantee on his best battery.

Know the ampere-hour rating. Somewhere stamped on a new battery you should find a number. Let's say you use a six-volt battery. The number might be

70, and it's important.

It means that your battery, theoretically, could pour out one ampere per hour for 70 hours—it has a 70-ampere-

hour capacity

Now a new 70-a,h, battery may be just fine if you live in a mild climate, you don't load your car with power gadgets and you drive enough to keep your battery well-charged.

But suppose you face tough winters, use radio, heater and extra lights a lot, and drive the car mostly on short trips around town? Short trips pull a lot of power and your generator doesn't have time to put it back.

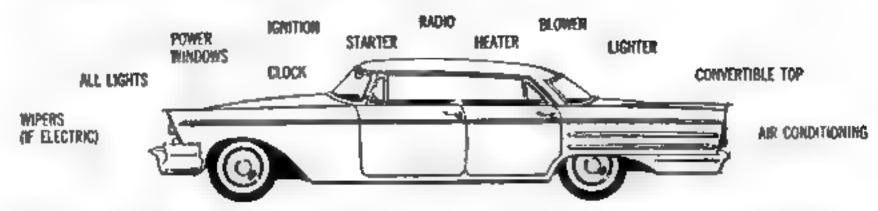
Then you want an 80- or 90-amperehour battery. Or you might go to 100,

105, 115 or even 120.

What about 12-volt batteries? If you have a new car and use a 12-volt job, chances are the number printed on the battery ranges between 45 and 65. That's because 12-volt batteries have lower ampere-hour capacity. (Having twice the voltage, they need less amperage.)

If you're using a 50-a.h. battery, and do mostly city driving, with quite a few

A battery must provide power for . . .



HEAVY ELECTRICAL DRAIN in a modern car could quickly kill an inadequate battery. That's why you can't risk buying a weaker battery than

the one that came with the automobile. If you add air conditioning or other accessories you may need a still stronger one.

electrical accessories, you may want to go up to 55, 60, 65 or (in larger cars) 72. Price goes up with ampere hours. But so does guarantee time.

Check the cranking time. On some battery cases you will find another number next to the ampere-hour rating. This tells you how many minutes, at zero degrees F., your battery is guaranteed to turn your engine. (This is an important figure to know; if it is not printed on your battery be sure to find out what it is.)

When you turn the switch, your starter pulls out gobs of power. On a warm day, this "draw" may be 300 amperes. On a cold day, it may jump to 450 or even 650.

This demands a battery with plenty of reserve power because at zero degrees all batteries get quite feeble. (They're only 40 percent as strong as on a hot day.)

Some batteries are guaranteed to pour out 300 amps for 1.7 minutes of zero cranking—and you will find 1.7 printed on the case. One example is a 70-a h. six-volt battery that sells for \$13.85. The same maker's 100-ampere-hour battery cranks for 3.5 minutes and costs \$20.45.

How many plates do you need? When you crank, the acid literally storms the lead plates in your battery. The more plate area the acid can attack in a split second, the more starting power you get.

Unfortunately, most manufacturers are quite secretive about plate area. They don't publish figures. But they do publish the number of plates.

The number of plates can fool you, however, since they aren't all the same size. Large batteries may have larger plates, but not always. Some "bargain batteries" look just as big as costlier batteries, but contain much smaller plates. Many of these batteries go into used cars.

Rather than number of plates, base

your choice on ampere-hour capacity. This capacity varies directly with plate area.

If hat about a dry charge? Some batteries are filled with acid and water at the factory. Others aren't filled until the dealer sells them. These are called "drycharged,"

Dealers like them. Factory-filled batteries on a shelf deteriorate unless the dealer keeps charging them. But when a dealer stocks an empty battery he can forget it until you come in to buy it. Then he fills it, shoots a quick charge into it, and off you go. This takes about a half hour.

Such a battery costs a dollar or two more. But you do get a "fresh" battery. It hasn't begun to live—or age.

Never accept a partly charged battery. You pay for a full charge, no matter what kind of battery you buy. Get it. If a battery has just been taken off the charger each cell should report in at 2.12 volts or a trifle higher. If it's been standing a few hours, cells should test evenly at 2.10 volts.

A hydrometer test should show a specific gravity reading of 1.260 at 80° F. (Be sure your dealer corrects for temperature. He has a correction table.)

To buy a partly charged battery is dangerous. If you rush off on a long trip, your generator may bring it up all right. Otherwise, it may remain partly charged for weeks in your garage, or on short trips around town—and that may take weeks off its life. (It is particularly important to have a dry-charged battery fully charged when your dealer puts it in your car.)

Are 12-volt batteries more reliable? No. The 12-volt is no more, no less, reliable than the six-volt. Maybe you've heard that 12-volt batteries sometimes quit in dense, slow traffic. That's not the fault of the batteries. Today's 12-volt cars have lots of electric gadgets. The battery drain, in stop-go-idle traffic, is something terrific. Your generator as a rule doesn't cut in until 18 m.p.h. or thereabouts. So when you creep through traffic you "starve" your battery. This is the biggest single reason for buying enough ampere-hour reserve,

You may ask: But since a 12-volt battery has only about half the ampere-hour reserve, won't it quit sooner than a sixvolt? No. That's because, with twice the voltage behind it, it is capable of the same total amount of work. Remember:

Work depends on voltage times amperage.

Recent improvements: Battery cases are stronger, less apt to crack or warp. Some are said to have 50 percent more impact resistance than a few seasons back, Many low-cost cases are made of a bituminous composition or plastic; many higher-cost cases

are made of hard rubber. All are molded in one piece, with tops sealed on.

Plates are stronger, last longer than a few years ago. All plate separators used to be made of wood, and many still are. But overcharging can char wood, and so separators of plastic, porous rubber and fiber are being widely used. Sometimes glass-fiber mats are used between separators and plates. These help hold the lead "active materials" in place so they won't slough off the plates and weaken plate-power.

Some fill plugs are improved: to prevent overfilling and make filling easier.

The electrolytic fluid is a weaker acid mixture than formerly. Lately, manufacturers have found that batteries perform just as well with a fluid of only 1,260 specific gravity (1.260 times as heavy as water). In older batteries it was 1.280. The weaker acid lets your battery live longer.

It's worth knowing that all battery plates contain a sneaky sort of metal called antimony. Antimony is needed to beef up the plates and put backbone in them when they're molded. But antimony is a traitor in a way. It has a bad habit of alipping out of the positive plate and going over to the negative plate, taking with it tiny charges of your valuable electricity. Result: Your battery runs down slowly when not in use.

Lately all manufacturers have found they can cut down on the amount of antimony, and some have gone a step further. To seal the antimony in the plates, various alloys are now used as "jailers." One of these is silver cobalt.

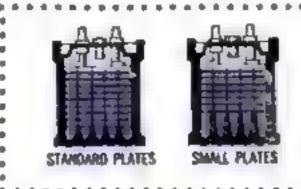
How effective are the new alloys? There is no general agreement yet among manufactur-

ers. Some makers think they help a good deal; other makers doubt it.

What about the nickel-cadmium battery? Just relax. It does a fine job in planes and locomotives. But it costs four or five times as much as your lead-acid battery. Chrysler offered it for a while as an option on some high-priced cars, but later discontinued the option. Reason: "It costs too much."

The Sonotone Corp., which makes it in the U. S., isn't aiming at the auto market. Some experts say the battery works wonders in sub-zero climates.

But even pioneers like the Sonotone people say that under *most* conditions you're well off with the right package of plain old lead and acid.



BATTERY \$125 is no assurance that you get your money's worth. Some may look just as big, yet give you less plate area because of false bottom.

Next Month: Why Kill a New Battery?

You can buy a new battery every year. Or you can buy that same new one every three years. What you spend this way depends largely on how you take care of that all-important energy-storage box. Next month's Popular Science will feature another revealing article about batteries. It will tell you how to make a new battery last many, many months longer.

New Home Incinerators Burn Their





Own Smoke

Hold a match in a cigarette's smoke; the smoke disappears. The same principle of two-stage burning makes new indoor trash burners truly smokeless

HE home incinerator has been brought in from the back yard. After more than six years of laboratory research, new smoke-free and odorless incinerators have been perfected for use inside homes. Makers are introducing them this month.

The new models are trim little gas burners. You install one in the basement, utility room, even the kitchen. They have been designed for acceptance in communities that now restrict or forbid the use of conventional incinerators.

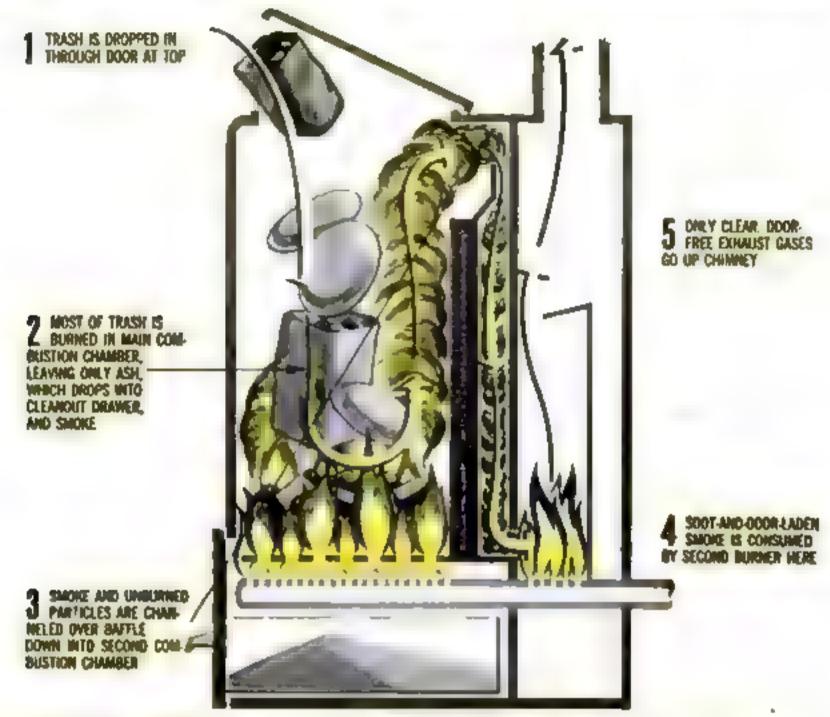
They'll burn anything except metal and glass. Bones, sweepings, paper and wet and dry garbage are reduced to a white powdery ash. Spread on flower beds, this makes a fine mulch, say experts.

Afterburner eliminates smoke. Conventional incinerators have a single combustion chamber that does not always fully burn all of the waste, Sometimes unburned particles are blown up the chimney, producing smoke and odors.

The new models work on the 100-percent combustion principle long used in big commercial incinerators. They have a main combustion chamber, plus a second chamber—the afterburner. Any unburned particles that get away from the first burner are completely consumed by the second one. Result: no smoke or odor to go up the chimney.

They're tested. To meet anti-smog requirements of many communities, the American Gas Association set up stiff

How the new two-stage home incinerators work



SECRET OF CLEAN WASTE INCINERATION is the second burning that consumes particles and eliminates noxious odors that otherwise would escape up the chimney as "smoke."

standards for each manufacturer to meet.

To date, seven new makes have full AGA approval or are expected to have it soon. They are Bowser (Smogmaster), Calcinator, Caloric, Locke Stove (Warm Morning), Majestic, Martin Stamping, and Waste King.

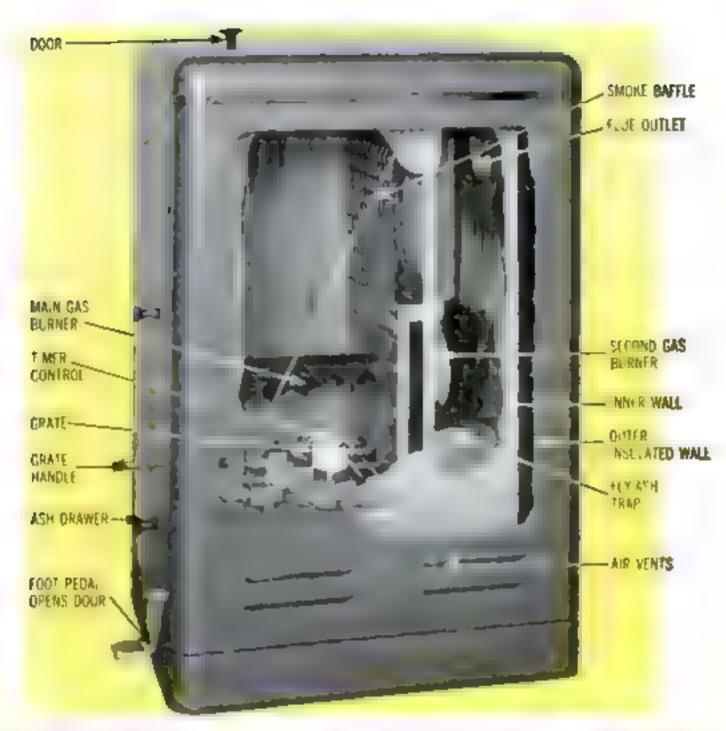
Sales are expected to hit 200,000 a year almost immediately, eventually climb to a steady 400,000 a year. (Sales of conventional gas incinerators have reached, all told, a relatively puny 400,000 over the past 10 years.)

They're inexpensive. The new incinerators will sell for about \$175 for one with a 1½ bushel capacity, up to \$225 for two-bushel models. By home-appliance standards, this is a modest price, say the

makers, for a machine that will do a quick, clean job of removing up to 75 percent of daily household waste. Other types of disposers get rid of as little as 15 percent, they argue, because they're limited to food waste only.

Operating costs run about three cents a day, or \$1 a month. Installation may cost from \$20 to \$50, though some dealers are expected to toss it in free to encourage sales. You need two hookups, a flue vent to your chimney and a connection to the gas supply. Any type of gas will do—manufactured, natural or bottled.

Most chimneys are big enough to take on an incinerator along with the furnace, but they must be of the Class A type (masonry or factory-built). Class B chim-



INSIDE A NEW TRASH BURNER. It took the industry six years to design the right com-

bination of burners, baffles and flame control to insure 100-percent combustion.

neys, a low-cost variety found mainly in the South and West, won't withstand the high-temperature incinerator exhaust

For economy and appearance, it's best to keep the connection to the chimney as short as possible, which means placing the incinerator against or near it. If you don't have a chimney or it isn't easily accessible, you can buy a Class A prefab chimney for about \$75 to \$100.

They're automatic. To start one of the new models, you simply drop in a load and set an automatic timer according to the type of waste. The wetter it is the longer it takes. Most loads are completely consumed in one to four hours,

At the end of the preset interval, the burner shuts itself off, so that it can be run unattended at any time during the day or night or when you're away. The fine ash that forms needs to be cleaned out only about once a week.

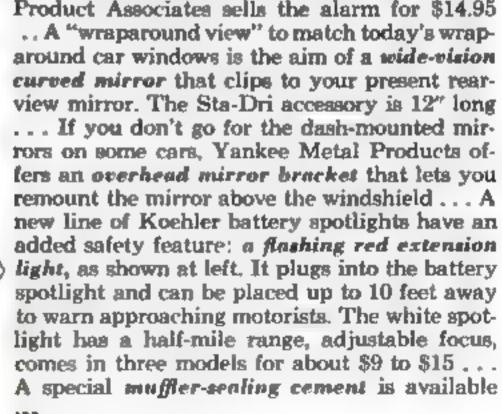
For safety, all gas incinerators have an automatic valve that shuts off the gas if the pilot light goes out. The makers also claim that they stay cold to the touch because of a heavy jacket of insulation, so there's no danger of burns to young children. Several models have treadle-operated doors that leave hands free.

To be sure of getting a good unit, see that it is clearly labeled "smokeless and odorless" and carries the AGA approval. Some new models are similar to the old ones on the outside—but not on the inside. —A. M. Watkins.



for your car Nearest thing to radar for cars is an automatic parking alarm that

sounds your horn whenever another car parks too close or when you have to "feel" your own way into a tight space. The projecting feeler, shown above, can be mounted on either the front or rear bumper and is connected by a single wire to your horn. Pressure on the feeler trips a switch that sets off a continuing blast until pressure is released.





88 POPULAR SCIENCE

from the Magic Iron Cement Co. for patching rust leaks and loose joints. You don't have to move your car or jack it up to put on the quickly mounted tire chains at right. Two bent-wire arms built into the sides let you slip the chains up under the fender and over the wheel. Then you simply reach behind the wheel with a long hook to fasten the inside The outside is latched in the conventional way, and spreaders pull the chains taut so the inner hook can't come undone. The Campbell chains come to fit all wheel sizes for about \$15 to \$18, and the maker even throws in a pair of plastic sleeve protectors.

Signs that summer isn't far off: Screens for car windows keep out bugs when you stop to camp, eat or catnap. Made by the Car Bed Co., they have self-adhering edges. You just press them on, or roll them up for storage in the glove compartment . . . If you like the sun and fresh air enough to spend \$300 to \$500, you can have a sliding roof installed in your car, station wagon (right) or even cabin boat. Two styles, metal and fabric, are made by Golde Body Parts, and you can even have your choice of manual or automatic electric operation . . . Less luxurious, but useful, is a car-wash mitt that keeps your hands dry while you wipe on the suds. It's sold by F.P.I., Inc. for \$1.98 and has a pocket in the back that holds detergent powder.

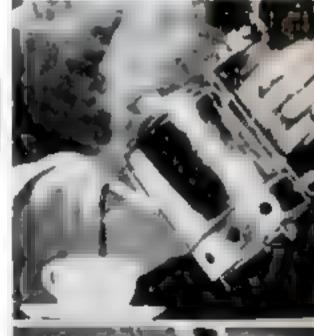


for your leisure hours

Two new uses for small, disposable tanks of gas: One is a gas-fired percolator that assures hot coffee on camping trips. Made by Blu-Burn-R Products, it will perk up to 12 hours before you hook on a new tank . . . Another is a Kerr portable air horn, also powered by a disposable gas tank, that you can carry in a boat. Price: \$9.95.

Prefab summer cabins are being offered by two makers. Pan-Abode puts out a log-cabin type with the claim that you can assemble it in as little as an hour, without any nails. The smallest of several sizes is 12' by 17' for \$800. Arnold-Dain uses a system of 3' wall panels for any size plan from small tool sheds and pool cabanas to large summer homes. Prices range from \$350 to \$1,000.

Two Sputnik-inspired items: A 45-r.p.m. record of the satellite's actual radio beep, available for \$1 from Mooney-Rowan. There's also a satellite plotter, for \$1.95 from Library of Science, that shows when the little moons will pass over any given spot for best viewing . . . A new alternasistor short-wave portable radio that works on nine ordinary flashlight batteries is made by Zenith for \$250. A hinged handle snaps up to expose a 3' telescoping antenna, and eight bands give a tuning range from 540 kc to 22.4 mc. A log chart lists foreign stations and the hours of best reception.





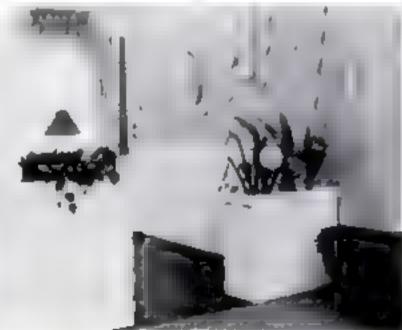
FEBRUARY 1958 181

what's new for your home

Flooring that you can also use as wall paneling now comes in striking prematched patterns of contrasting hardwoods. The planks are 10' and 12' long for floors, 8' for walls (left), so they span most rooms without the cutting and fitting of odd lengths. Made by Miller Brothers, they're also double standard flooring width to cut nailing time in half . . Slimmer TV sets, only 10" deep, are on the way from Sylvania. The trick? They let the flatter new 110° picture tube project 4" out front to pare away still more cabinet depth.

Revolution in cooking utensils: Electric skillets, grills. griddles and pans now have a single, removable power control to cut cost and permit complete dunking in water for cleaning. Sunbeam, Dominion and Universal are among the trend-setters . . . Tappan's new counter-top range comes with a built-in motor that powers—count 'em—a food blender, mixer, meat grinder, fruit juicer and knife sharpener. Who says men have all the power tools? . . . Only thing that isn't self-powered is a non-motorized portable dishwasher (center, left) that uses faucet pressure alone to spin a rotating water spray. The 11-pound Chico unit is said to clean eating ware for a family of five in about six minutes. Price: \$59.95 . . . Breath sweeteners for air conditioners are now available in the form of odortrapping carbon filters that fit directly behind the dust filter. They're made in four standard dust-filter sizes by Conner Engineering . . Inexpensive brick veneer can be made by pouring ordinary plaster-of-Paris into plastic molds (below, left). When hard, the "bricks" are put on with tile cement and painted (right). Two molds, for standard or Roman face-brick, are sold by the Official Decorator Mold Co. for \$2.98.





for more information:

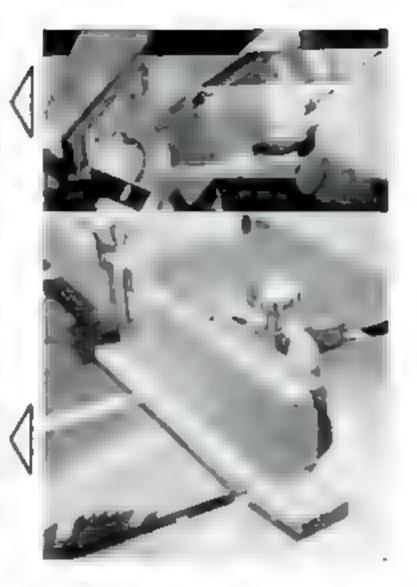
Here's where to write if you can't get any stem lated above; R. W. Anderson Co., 1110 W. 68th St., Lot Angeles 44; Arnold-Dain Corp., Rt. 6, Mahopac, h. Y.; Blu-Burn-R. Products, Highway 69 S., Montor, Wis., Campbell Chain Lo., 1 ork, Pa., Car Bed Co., P. O. Hot 213, Panama City, Fla., Chica General Products, 525 Market St., Sen Fran-

cisco, Conner Engineering Corp., Danbuty, Corn; Diamond Expansion Bolt Co., 500 North Arc., Garwood, N. I., Dominion Electric Corp., Manufold, Ohio, F.P.I., Inc., 336 3rd Arc., NIC 10, Galde Body Parts, 6636 Charleoux Arc., Detroit; Kerr Chemicals, P. O. Bax 89 Park Reige, 111; Kochler Mfg. Co., Marthorough Man, Library of Science, 59 4th Arc., NIC 3, Magle from Cement Co., 5403 Roscer Arc., Clepciand, Masterline Products, 6715 Hollywood Styd.,

for the home shop

You can clamp a new miter guide right to the board you're sawing by adjusting two sliding plates. The Twix guide can be set to any angle up to 45° in both directions, fits all stock up to 8" wide, and sells for \$2 . . . A built-in wire stripper now comes on Wirestripper screwdrivers. You just pull a wire through a hole in the handle to remove the insulation.

Interchangeable jawa for pliers let you set or remove rivets, crimp metal and punch holes. They're made by Time Saver Tools in many types to fit cam-action pliers . . . Critical saw settings are quickly made with an adjustable table-saw stop that slides on a rail fastened to the miter gauge. You first lock the stop in approximate position, then adjust a screw feed for pinpoint accuracy. The stop swings up out of the way without disturbing the setting. R. W. Anderson sells it for \$3.50.



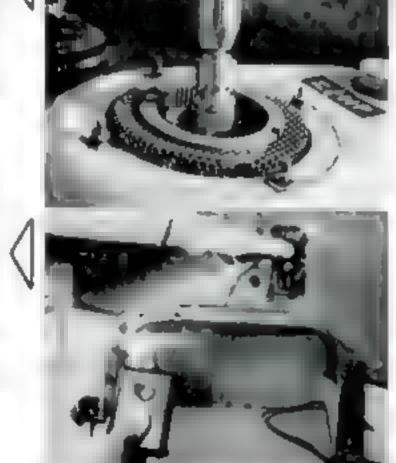
for the home handyman

You can start a power mower with an electricdrill attachment sold by Rotex. A toothed cylinder, chucked in the drill, spins a matching toothed nut screwed permanently to the mower's shaft. As the mower picks up speed, the drill is automatically disengaged by a ratchet action . . . It had to come: A four-color ball-point pen for \$4 by Masterline.

Two extra-short expansion anchors, made by Diamond and by Molly, are designed to attach things to hollow-core doors and over narrow furring strips where space is shallow . . . A new Plug-Rite neon tester tells instantly whether an appliance, radio or power tool is correctly plugged in, to avoid a "hot chassis" that can cause shocks. If the light glows, you reverse the plug in the wall . . . For the handywoman: pre-measured somp packets by Reynolds Metals.

Toss 'em in a washer the packets dissolve.

Sheldon gallager



Hollywood Calif Miller Benthers Co., Johnson City Jenu. Mully Chep., Reading, Pa., Mooney-Rowan Publications, Severas Park, Md; Official Decorator Mold Co., 96 fine mingo Rd, Levittoun, N Y; Pan-Ahode, Inc., Acanadair Rash Ping-Rite Inc., 3232 Olive St., St. Louis Mo., Product Associates, 1946 S. Olive, Los Angeles; Bornolds Metals Co., 3242 Georgia St., Gary, Ind., Roten Sales Co., 5393 Sovereign Ross Dullet, Tex., Sta-Del Penducts, 147 ff 4th

Are Districtione, N. Y: Sunbeam Corp., 480 Russevelt Rd., Chicago, Sylvania Electric Products. 1210 Resolute Net IV. Tappan Store Co., Manifeld, Ohio Time Saver Tool Corp., 1116 Watern Ace Hammond Ind Twin Mfg. Co., 40-09 214 St., Long Island City N 1 (Internal) Landers, Frony & Clark, New British Com., Wirestripper Tools, Inc., Island Red N 1., Yankee Metal Products, Naturals Comp., Chicago.

4 Bargain Tables from Flush Doors

Home

Shop

and

By Darrell Huff

HE advantages of making a dining or coffee table from a flush door have multiplied as the prices of these handsome doors have dwindled.

You can put together any of the four

smart tables shown, using a hollow-core door, in an evening The door will cost as little as \$6 to \$10 in colorful Philippine mahogany, perhaps 50 percent more in blond birch. Add a few dollars for underpinnings and edging and you have a really big table

at a bargain price.

The designs are easily modified in height. Make a dining table or writing desk 28" to 30" high, typewriter desk 26", coffee table about 15". Choose a door 36" wide if you're making a dining table, one anywhere from a width of 24" up

for a coffee table, serving table or desk.

Nearly all doors are 80" long. You can trim one down for a shorter table. Or you can cut it into two or three pieces for a set of small tables.

For a utility or outdoor table, or one to be enameled, you may find a door

made with hardboard surfaces for \$3 or \$4. A door with one side scratched or gouged is often available at a bargain—and who sees the underside of a table?

Directions for making legs for the tables shown are based on using a select grade of construc-

tion lumber from the lumberyard. If you make them of hardwood instead, you can reduce these dimensions slightly. For instance, instead of two-by-fours use hardwood about 1½" by 3½".

A clear finish will preserve the natural beauty of the attractive woods used in



Combining modern simplicity with traditional shape and construction, this big table uses the full expanse of a 36"-by-80" flush door for roomy dining.





2. Splay-Leg Table

Each pair of legs is taper-ripped from a single piece of standard fumber. The taper gives a neat, slanted effect without the use of angle mounts.

3. Hollow-Square Table

A pair of open square frames support this attractive dining table and provide solid cross braces. Wedge-shaped corner blocks reinforce the two frames

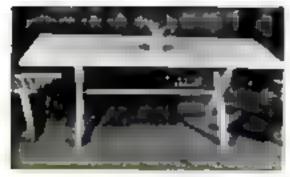


4. V-Leg Table

This simple plan coables you to build a table in an hour or so. The legs are made by joining two pieces of lumber to form a Vshaped trough.

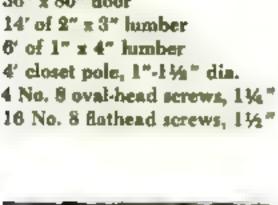
For construction details, see the next three pages

FEBRUARY 1958 185



Materials for the Early-American Treatie

36" x 80" door 14' of 2" x 3" lumber 6' of 1" x 4" lumber 4' closet pole, 1"-11/4" dia. 4 No. 8 oval-head screws, 134"





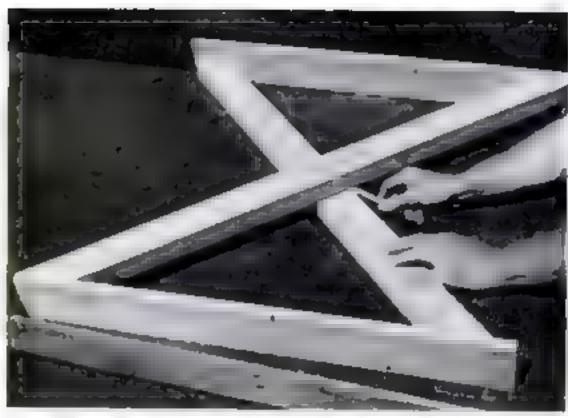
Materials for the Splay-Log Table

36" x 80" door 5' of 2" x 8" lumber 4' of 2" x 6" lumber 16 No. 12 flathead screws, 2"

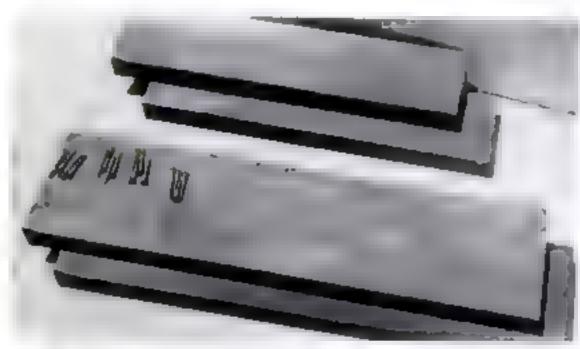


Materials for the Hollow-Square Table

36" x 80" door 2 lengths, 10' each, 2" x 4" lumber 28 No. 12 flathead screws, 2"



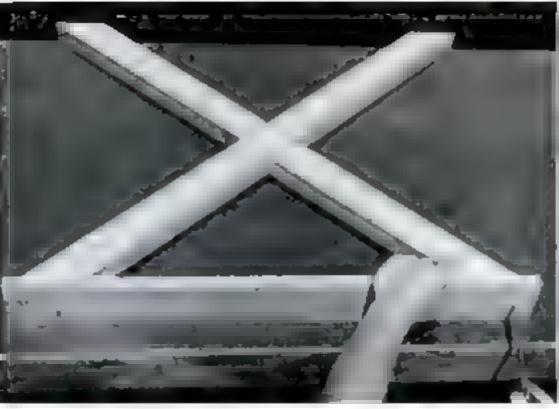
CUT four 35%" legs with 45° ends from twoby-three; two 31 3 16" braces from one-by-four Cross legs between braces, mark half-laps and cut them. Bore each inner leg for pole.



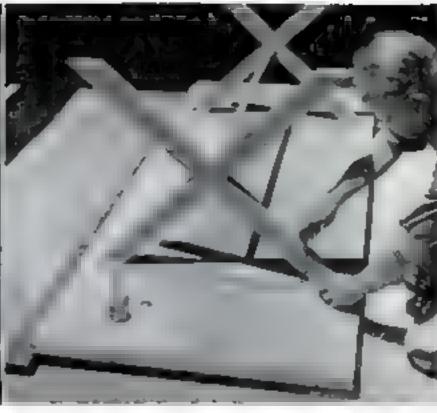
CUT the two-by-six into two 221/2" crossbraces. Saw each two-by-eight into two 281/2" preces and draw a diagonal line ending 11/2" from opposite corners. Rip along this line to make legs.



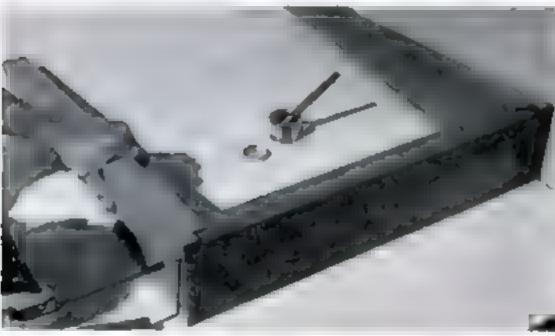
CUT each two-by-four into two 221/4" lengths and two 281/2" lengths. Rabbet all ends and make two identical rectangular frames, using glue and two screws at each rabbeted corner.



FIT half-lapped legs to crossbraces and fasten the top ends with glue and 1½" flathead screws to make trestles. Then secure the lap joints with glue and 1¼" oval-head screws.



ASSEMBLE the trestles to the underside of the door after gluing the pole between them. Drill four holes for screws in each crossbrace, spread glue on meeting surfaces and fasten.



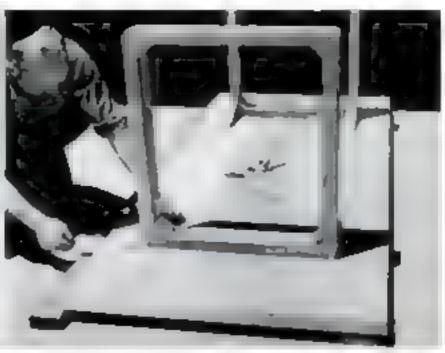
FIT rabbets cut in the upper leg ends to matching rabbets cut in the crossbraces, and fasten them with glue and two screws at each joint. Countersink the screw heads in the legs.



ASSEMBLE the table. Place the legs 12" to 16" from the ends of the door, square across it and an equal distance from both edges. Fasten each brace with glue and four screws.



FIT two triangular blocks cut from leftover twoby-four and glue them to the inside corners of the frames. Drive one screw through each triangle to pull it up against the frame.



ASSEMBLE the frames to the door with glue and four screws. Screws alone would not hold in the thin veneer. Round off the bottom of each square as shown. (Please turn the page.)



Materials for the V-Leg Table

36" x 80" door 10' of 2" x 12" softwood (only 5' for 15"-high coffee table) 12" x 14" piece of 1" lumber



CUT the two-by-twelve into four 28" lengths and rip 1%" off two of them to make two troughs with equal sides when butted. Saw diagonally across the 1" lumber for the triangles.



FIT a triangle to one end of each trough and glue it. When dry, center the troughs 8" from the door's ends and glue them. Pile on books to apply pressure while the glue sets.



FIUSH DOORS sawed in two to make similar tables, probably will have open space at ends. Fill these by cutting blocks of scrap lumber and gluing them flush with the veneer edges.

flush doors. One of the wipe-on sealers can be applied so quickly with a soft cloth that you really can finish your table in a single evening—and use it the next morning.

How to cut a flush door. When you saw a flush door in two to make smaller tables, the cut ends will probably have open hollows. Fill them by cutting blocks from scrap lumber and gluing them in flush with the veneer surfaces. Plane them smooth after the glue dries.

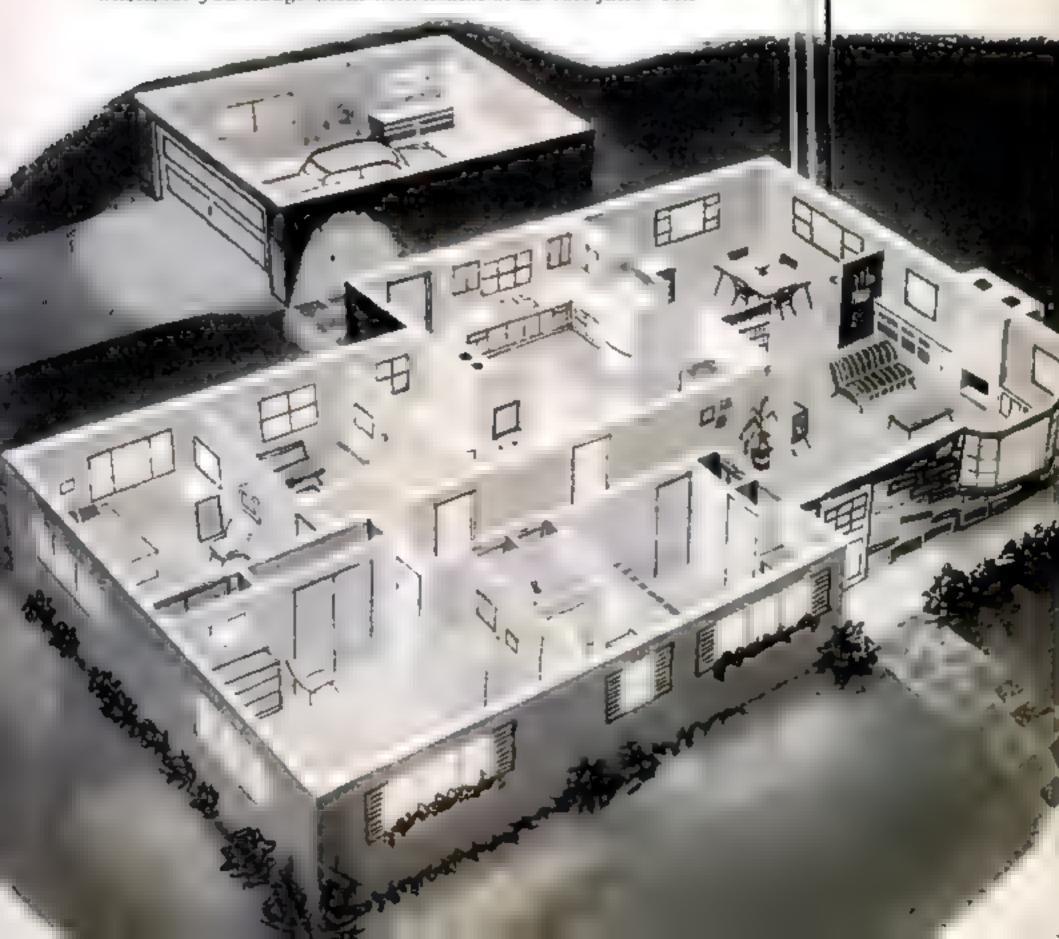
If you're building a table to grace your dining or living room, you'll probably want to conceal the lumber edges of the door with strips of matching veneer, now widely available in lumberyards.

To apply the veneer, brush a coat of contact cement onto the edge of the door and the veneer strip. Let the cement dry 30 minutes, apply another coat and let it dry 30 minutes. Place the veneer exactly in position and press firmly. Trim flush with a plane and sanding block.

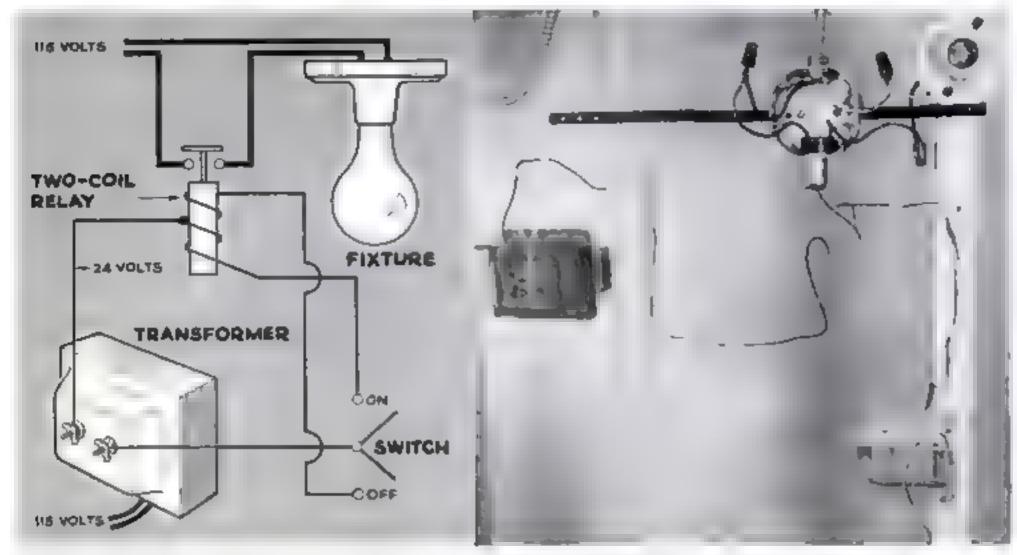


Simple relays put you in control of lights and appliances from any part of the house

EMOTE switching—the house-wiring system that puts any number of electric circuits under your control from as many switch locations as you wish—is well past the luxury stage. Today you can buy inexpensive and easy-to-install components for such a system and tie them into your present 115-volt circuits. Once they're installed, trim little relays will open or close these circuits whenever you nudge them with a shot of 24-volt juice. The



Basic multiple-switching hookups.



REMOTE-SWITCHING CIRCUIT is shown above in schematic drawing. A transformer supplies the 24-volt current needed to operate a two-coal relay which opens or closes a 115-volt house circuit, depending upon which coil is energized by a two-position, momentary wall swatch.

OUTLET-MOUNTED RELAY MOCK-UP. Here, each circuit-opening and -closing relay is set in the outlet box of one of the fixtures it controls. In most home installations of this type, a single transformer does the job, supplying low-voltage current for all of the relays in the house.

systems are amazingly versatile—you'll find many ways to use them

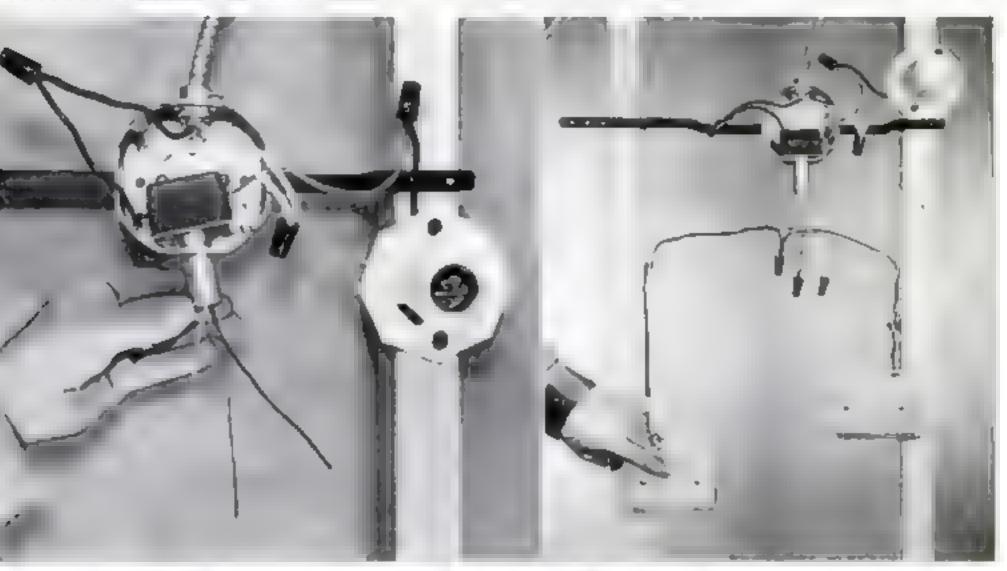
If you go for a complete house installation, you'll have a central control station, usually located in your bedroom, from which you can open and close any one of eight independent circuits, or all eight simultaneously. One circuit might floodlight your yard, illuminate a post lamp, and turn on the porch lights. Another might project a path of lights from your front hall through the living and dining rooms to the kitchen. A third and fourth could determine the lighting level in the living room—one by turning on a pleasing arrangement of table and bridge lamps; the other, by cutting in the overheads and wall fixtures.

This central control station—a checkerupper that lets you douse the last of the lights when you go to bed, or flood your home with illumination in an emergency —is only part of the deal.

There's no limit to the number of control stations you can have. For that path of light between the front hall and kitchen, for example, you'd place other control switches close to the front and back doors, and at one or two intermediate spots.

What makes this modern switching system so flexible is its use of secondary, low-voltage circuits to operate relays that open and close the 115-volt light and appliance circuits. Its basic parts are: (1), a transformer, which reduces ordinary house current to the low-voltage juice that operates the relays; (2) a two-coul relay for each 115-volt circuit; (3) a two-position, momentary switch at each control station; and (4) low-voltage conductor wires to deliver the output of the transformer, through the switches, to the relays.

Transformer. With a single exception, the manufacturers of remote-switching systems use one 24-volt transformer to energize all of the relays in a complete house installation. This transformer can be mounted in a standard 4"-square box, with its 115-volt pigtail wires spliced directly to a house circuit. On the low-voltage side, one of its pigtails is connected to wires going to the wall switches; the other, to wires leading to the relays.



VARIATION of an outlet-mounted relay system uses a combination relay and miniature transformer for each circuit, eliminating the need for long wire connections to a common transformer. In all multiple-switching systems, wires are color-coded for easy circuitry.

MULTIPLE SWITCHING, no matter what system you use, lets you control both single- and multiple-fixture circuits from as many switch locations as you wish, as well as from a master station. It's just a matter of tying a low-voltage, three-wire line from each switch to the relay.

The only exception to this common-transformer setup (Remcon's) incorporates a miniature transformer built into the base of each relay, eliminating long, low-voltage power leads.

With both systems, the transformer provides a safety feature. Its limited output protects the wiring against overloads, even in the case of a short circuit. Thus no fuses are required. And because the switches draw current only momentarily, there is no drain on the transformer.

Relays. The relays used with either a common transformer or with the minitransformers have pigtail wires for connections to the 115-volt circuit. At the other end of each relay is a tubular shank that fits into any ½" knockout hole in a fixture box.

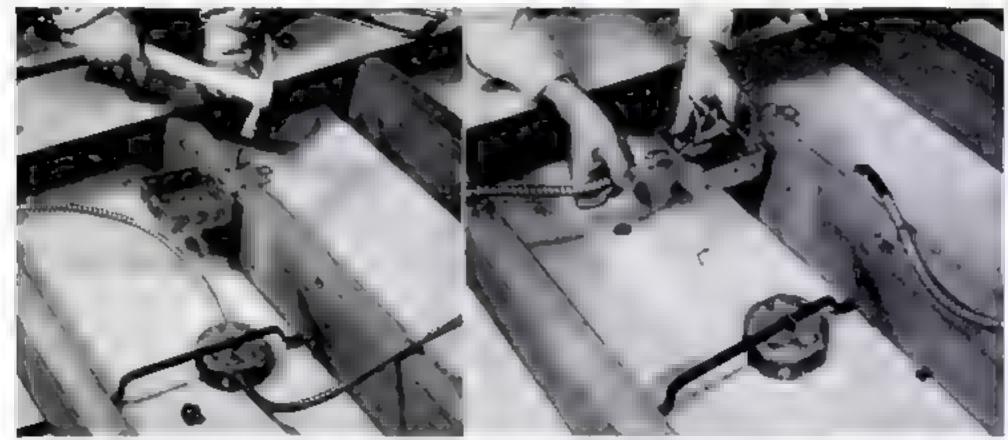
Three color-coded, low-voltage pigtails project from the shank for switch connections. Wires attached to the red pigtail go to the *ON* terminals of wall switches; those connected to the black pigtail go to *OFF* terminals. The third, or white pigtail, on relays that do not have a built-in transformer, is attached to one of the

transformer leads (the other transformer lead goes to the common terminals of the wall switches). If you use mini-transformer relays, wires go directly from the white pigtail to the common switch terminals.

Wire. Plastic-coated, three-conductor wire is used in the circuitry between the switches and relays. With a common-transformer hookup, you also need two-conductor wire for the transformer leads. You can either buy this two- and three-conductor wire already made up, or twist separate, insulated wires loosely together. No conduits or raceways are required.

witches are mounted either singly or in groups on cover plates that attach to conventional gem boxes. You can also buy a rotary selector switch which you simply turn to the desired house-circuit number and actuate by pushing a single switch button. Another gem-box fitting that is particularly useful is a receptacle plate with three outlets, one of which is marked for wall-switch control (you wire the other two in the conventional way, for control at the plugged-in appliances or

One way to solve a relay-mounting problem .



ACCESS TO OUTLET BOXES in an unfloored attic is easy. But a center stud in this ceiling fixture box leaves no room for a relay. In such cases, nail a new fixture box with 42" knockouts to the top of a nearby ceiling joist.

DISCONNECT EXISTING POWER-FEED and switchleg cables from the old outlet box, and run the power feed to the new one through a knockout. Tape up the end of the old switch-leg cable—you no longer have any use for it.

4.000	at the	basic parts	Lust	
PART		MANUFACTURER'S NUMBER	LIST PRICE	
B	ryant a	nd General Ele	etric	
TRANSFORMER		RY-1	\$ 8 00	
RELAY		RH-2	3.30	
	FLUSH	RFS-1	.39	
EWITCHES	SURFACE	R\$\$-1	.69	
	MASTER	RM5-2	8.40	
WALL PLAT	ES	RP-1, -2, -3, -4**	.27	
2-CONDUCTOR WIRE		per 1,000 ft. 15 10		
3-CONDUCTOR WIRE		per 1,000 ft. 21 20		
		Remoen		
RELAY (BUILT-IN TRANSFORMER)		R-115	\$ 4.20	
SWITCHES	SINGLE	\$-1	.45	
	MASTER	MS-9C	9 00	
WALL PLATES (IN- CLUDING BRACKETS)		Pt-1, -2, -3, -4, -6**	.40	
		Square D		
RELAY		1070-C	\$ 3 60	
I WITCHEI	SINGLE	1091-C	.50	
	MASTER	1109-5	6.90	

**Numeral indicates number of switch openings.

lamps). All remote-control switches have color-coded terminals, to simplify the wiring for you.

Which system? Before you install any remote-control switching system, determine which fixtures are best controlled singly, and which in groups. Remember that you can also control any single fixture in a group circuit, if you install a relay at each fixture box.

Look over your house, too, with a view to special installation problems. It may be that one or another hookup, or combination of hookups, can simplify the job. If you are building a new home, running low-voltage switch circuits to remote points is not difficult, and you might go for a layout in which all relays are mounted in a single gang box, close to a common transformer.

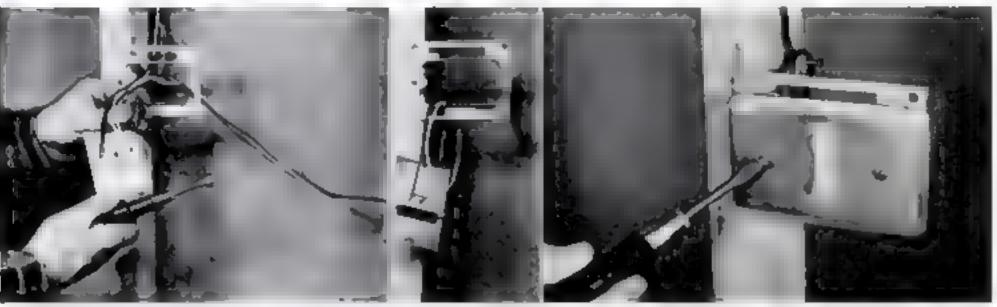
In an old house, however, this method could present a difficult wire-threading problem. Here you might find that placing a relay in a junction box close to each 115-volt circuit is the best solution. Or the relays could be mounted in existing fixture boxes, or tied into the high-voltage switch legs in the gem boxes. The accompanying illustrations show typical examples of all such installations. Among them should be one that is just right for you.—Ralph Treves.



RUN A CASE from the new box to the fixture connections in the old one. Install the relay and make soldered connections, secured with tape or wire nuts. House current will now pass to the fixture through the relay.

MATCH COLOR-CODED LOW-VOLTAGE PIGTAILS with three-wire leads going to the wall switches. Here again, use soldered connections with tape or wire nuts. You can either buy three-conductor wire, or use independent wires.

2 ways to install switches

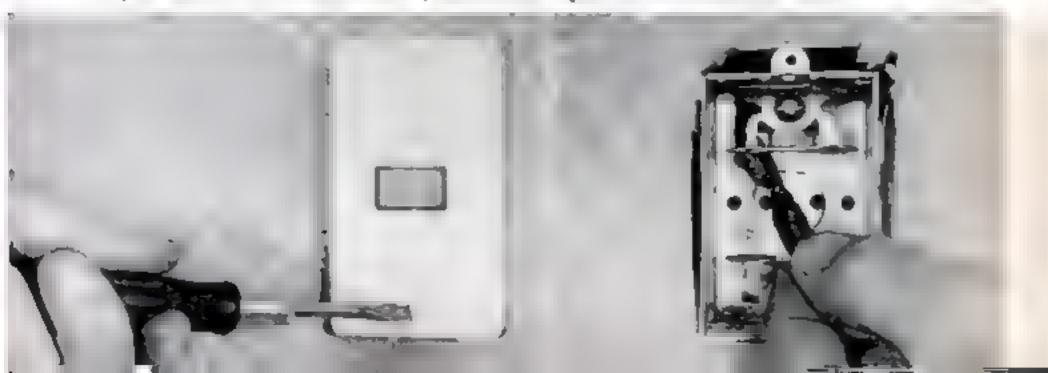


HOW TO WIRE CONTROL SWITCHES in parallel, along one lead, is shown in mock-up. Wires are continuous, with insulation stripped at each color-coded screw connection. The flush-mount

switch shown consists of a plaster ring, a single switch and wall plate. Other assemblies come with as many as nine switches, or a nine-circuit rotary selector, on one plate.

DESIGNED TO FIT, some remote-control switches will go in conventional gem boxes. If the box is big enough you can also mount the relay in it, instead of in a fixture box (connect the

high-voltage pigtails to ends of switch-leg wires). If you mount the relay in a fixture box, disconnect the old switch leg at both ends and push it out of the knockouts.

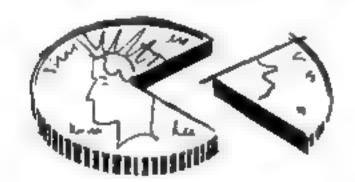




IG changes in living standards, taxes and credit conditions in the past decade have forced bankers to figure out a new way of estimating what you can pay for a house.

The best advice used to be that you could afford one costing about twice your annual earnings. The emphasis was on the price of the house.

The new formula disregards the price



tag on the house. Instead, you're advised that you can afford housing expenses, figured by the month, of about one-fourth your monthly earnings before income taxes, social security and other deduc-

Here's an example of why a new formula was needed:

Joe and Bill each earn \$6,000 a year. Each bought a \$12,000 house. Joe lives in an established section on the edge of town. He pays 15 cents' bus fare to get to work. Local schools are built and paid for, so his taxes are comparatively low. He had a refrigerator, washer and dryer all paid for-before he moved in. He pays 41/2% interest on his mortgage.

Bill lives farther out, in a new suburb He pays about \$10 a month more for taxes, another \$15 extra for commutation. After he took title to his house, he bought a refrigerator, washer and dryer on a twoyear installment contract. Costs: another \$35 a month. He pays 51/2% interest on his mortgage—about \$8 a month more than his friend

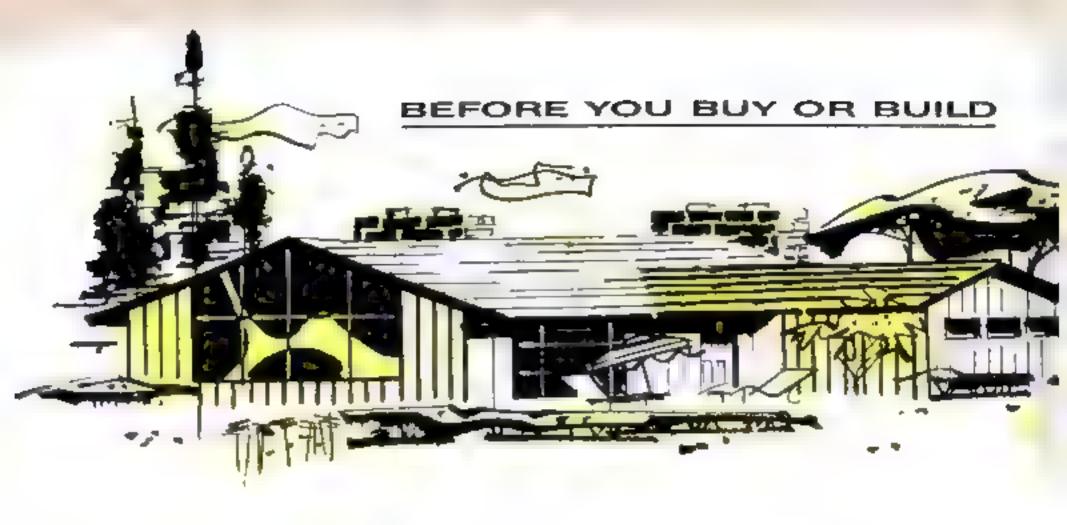
Joe meets his house costs comfortably. Bill sweats it out the first of every month. Yet, according to the old formula, each could "afford" his house.

The up-to-date way of figuring, could have kept Bill in the clear. This method would have told him that he was about to get beyond his depth financially. Since the new approach pins down all your housing costs on a monthly basis like rent, it's made to order for today's home seekers, dedicated buyers on the installment plan.

"We make thousands of mortgages every year," says Andrew Wilson of the Dime Savings Bank of Brooklyn. "We find that most new home buyers are more concerned with what they have to pay every month than with the builder's price. They're used to paying rent and paying off installment loans by the month, and it's easiest for them to visualize housing costs the same way."

This monthly basis of figuring is now

34 POPULAR SCIENCE



used by the Veterans Administration and Federal Housing Administration—which insure mortgages—and private lenders such as savings banks. Here's one version:

You take all expenses related to your house. This list includes your regular monthly outlay for taxes, interest and payment to reduce the mortgage; commutation to work (and to schools if your youngsters use public transportation); heating; sewer assessment; maintenance; water bills (if you buy your water); garbage collection (if you pay for that separately); and payments on appliances that used to be luxuries but are becoming musts in a modern home—items like dishwasher, garbage-disposal unit, exhaust fan.

Listing your expenses this way forces

you to consider variables that drastically affect overall housing costs. These variables include:

• How much money you put down: Every thousand dollars you add to your down payment reduces by about \$6.60 the amount you have to pay every month in interest and to amortize a 20-year mortgage at 5%. If you have a large chunk of savings, you might be able to afford a house priced thousands of dollars higher than the average man in your income range could handle. By making a larger down payment, you lower your actual monthly payments to the bank.

It is not recommended, however, that you strap yourself, leaving no cash backlog for emergencies. And don't forget

Beginning a new series:

Before You Buy or Build

Buying a house, or building a house, is a serious step for any family—often the biggest financial transaction in a man's life. Yet many take this step with less pause, less weighing of pros and cons, less checking of values, than when purchasing a car

Yet a home, and the land upon which it stands, can't be checked out in five minutes as you might a car—or traded in every year or so for a new model. To most people it means permanency. The chances are that you will be paying for it, and living with it, for many years. The pitfalls facing a prospective home buyer are many, from a falsely attractive price to defects in materials and construction that will show up with the regularity of the mortgage payments.

With this article POPULAR SCIENCE begins a fact-packed, authoritative series aimed to help you choose a house that will be not a headache but a home. Next month: "Buying a Development House."

moving-in expenses or that you may need to buy some new furniture for the new house.

- Terms of the mortgage: Some mortgage moneylenders may give you 30 years to pay, and charge only 5% interest. Other banks want 5½% and give only 20 years. The homeowner with mortgage A obviously pays less per month than the holder of mortgage B.
- Taxes: They vary widely from community to community. Buy a \$15,000 house in one suburb of New York and your tax bill may run as high as \$45 a month. A few miles away the monthly tax bill on a house of the same price may be only \$10. As a homeowner, you'll get part of the tax back; in filing your income-tax return, you can deduct your local property tax as well as all interest payments

Mortgage payments are about \$85.50 After you move in, you need those appliances and buy them on the installment plan. But instead of 20 years to pay, as on a mortgage, you get two years. Moreover, you pay 9% or 10%—not 5%—on the typical installment-buying loan. Every month you must dig up about \$87 for appliances alone. Add that to the \$85.50 going out on the house, and for quite a while you pay \$73.50 more a month than the owner of House A.

- Commutation costs: Bargain houses miles from town sometimes become mighty expensive when you add what it costs to get to work. Commutation can nick you anywhere from \$6 to \$60 a month. It should be figured as a housing cost.
- Age of the house: A newly built home generally does not need much up-

Figure all the bites in computing monthly housing cost



BIGGEST BITE is taken by the bank with mortgage-interest and amortization payments. Then come the smaller bites that represent the cost of day-by-day living. If all these add up to about a fourth of your monthly earnings, you are buying within your means.

on your mortgage. It makes a tidy sum.

That's why, here, you figure your gross income, before deductions, in computing what you can pay for a house. And other payments you make, for Social Security and pension plans, are of course really savings that you would otherwise budget for.

Utility costs: It's strange but true, real-estate men told me, but new home buyers, used to apartment living, often forget that they must now pay for water (unless there is a well) and heat. Those items are paid for by landlords, and tenants forget that they exist.

 Time-payment plans: How you pay for your home appliances may enable you to carry a higher-priced house.

Say you have a choice of House A versus House B. The first is \$15,000—but that price includes appliances such as washer, dryer, refrigerator, range—\$2,000 worth of "extras." Amortization payments on a 20-year mortgage at 5% interest come to about \$99 a month.

House B, without extras, is \$13,000.

keep for the first few years. After four or five years, however, you'd better allow two percent of the price of the house annually for such items as repairs, painting, replacement of worn-out equipment.

The new formula means that if you're a \$500-a-month man you can spend \$125 a month on housing expenses. The average man in the \$1,000-a-month class could spend \$250 without feeling hurt. The cost of the house itself becomes only one factor (a most important factor, to be sure) in figuring how much you can afford.

Say you earn \$600 a month, or \$7,200 a year. You may find that you can't carry a house with a \$12,000 price tag (well under twice your annual earnings) because other payments boost your monthly cost far above \$150. On the other hand, low taxes, low commuting cost and a long-term mortgage may enable you to handle a \$16,000 house with ease.

Not a rigid formula: Some authorities would argue that it's too conservative—that the average family could spend more on a house without straining the family

How to Figure What You Can Pay for a House

	y earnings (complete before income tax ser deductions)	
Value o	of employer's pension contributions (if any)	
Value o	of other fringe benefits (if any) *	-
	Life insurance	
	Health insurance	
	ek with your employer about these, and	
	Total Effective Monthly Income	
	Divide by four to get approximate amount available for monthly housing costs. Result:	
	your monthly housing costs	
	u navenant associate associated that and faterant	
on mor	y payment covering amortization and interest tgage	
on mor		
on mor	tgage	
on mor	tgage al taxes on property (per month) nurance on property	
Alt loca Fire ins Comme	tgage al taxes on property (per month) nurance on property	
Alt loca Fire im Comma	itaxes on property (per month) surance on property	
Alt loca Fire im Comma	itage il taxes on property (per month) surance on property station e monthly heat and water bills (estimate)	
Alt loca Fire inc Commo Average Sewer a Carbag Mouthicome p	It taxes on property (per month) surance on property station e monthly heat and water bills (estimate) assessment per month (if any) s collection per month (if paid separately) y installment-plan payments on appliances that beart of the house (dishwasher, clothes washer, dryer, rator, range, garbage-disposal unit, kitchen and at-	
Alt loca Fire im Comma Average Sewer a Carbag Monthi come perefriger tic fans Mainter	Itaxes on property (per month) surance on property station e monthly heat and water bills (estimate) assessment per month (if any) e collection per month (if paid separately) y installment-plan payments on appliances that beart of the house (dishwasher, clothes washer, dryer, mtor, range, garbage-disposal unit, kitchen and athouse (allow 1/12 of one percent of total sales house is less than 5 years old; 1/6 of one percent	
Alt loca Fire ins Commo Average Sewer a Garbag Monthi come perefriger tic fans Mainter	Itaxes on property (per month) surance on property station e monthly heat and water bills (estimate) assessment per month (if any) e collection per month (if paid separately) y installment-plan payments on appliances that beart of the house (dishwasher, clothes washer, dryer, mtor, range, garbage-disposal unit, kitchen and athouse (allow 1/12 of one percent of total sales house is less than 5 years old; 1/6 of one percent	



Moving-out day when a mortgage is foreclosed is something the bank wants no more than you.

budget. If the house you want comes too high, but it is important enough to you, sacrifices can be made in other ways.

A great deal, too, depends on your income bracket and your personal tastes in spending. If you're in a high bracket, you can splurge on housing and cut down on other luxuries—theaters, travel, entertaining—which others on your income level can afford. If you have a houseful of youngsters, you may spend less on shelter, more on food, clothes and school bills.

Other factors that might influence how closely you follow the formula include your own earning prospects and your town's tax outlook. If you're in a job where raises are reasonably to be expected, or have a business that is growing, you might go a little strong on housing now on the theory that earnings will catch up. But if your income is pretty well fixed—you're a civil-service employee, say—you'd better apply the formula strictly.

In some communities all basic improvements—schools, roads, town halls—are in and paid for. Taxes won't rise rapidly or unexpectedly as will those where improvements must still be made. Check on the school system. In a growing community this is the most important factor in anticipating tax rises. If your house is in a stable tax area, you might go a little beyond the one-quarter figure.

The bank's attitude: The main point in considering what you can pay for a house is to avoid having your mortgage foreclosed. You can help protect yourself by giving whoever underwrites your mortgage a true, complete picture of your financial condition.

Despite what the old nickel movies featured in their melodramas, bankers get no fun out of kicking you out and grabbing your home. Even if a banker had a heart of granite, he wouldn't want to do it. It's bad public relations, and state laws often clutter foreclosures with red tape that makes the proceedings more expensive than they're worth.

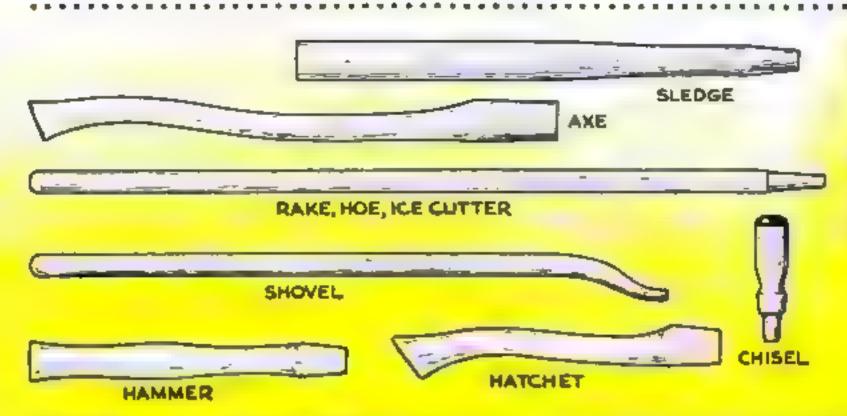
Most lending institutions don't include certain kinds of income in estimating your ability to pay. For instance, you're married, childless, and your wife works. If she's under 40, most bankers won't consider her earnings as regular income. They reason that she might have children and quit work at any time

If you follow the formula outlined above, the law of averages says you'll be able to meet your house expenses comfortably. Surveys by the Federal Housing Administration show that the typical home buyer spends 19.5% of his total earnings for housing expenses, including utilities, maintenance and mortgage payments. When you add an allowance for commutation and home equipment, the total comes to about a quarter of monthly earnings—the formula figure.

Add this to your Fix-It File. It'll help you maintain the tools that keep your home in order. A tool with a loose, cracked or splintered handle is a hazard. Most tools can outlast several handles; most replacements are easy.

Next Month: Window shades.

Popular Science Fix-It File



A HANDLE FOR ALMOST ANY TOOL can be bought, but take the old handle along to help

you find a match, and expect to do some trimming with a plane or rasp for a sing fit.

How to fit a new hammer handle



SAW OFF THE BROKEN HANDLE close to the head of the tool Procedure is much the same for hammer, hatchet, axe or sledge. With the tool held in the vise, try to tap the end of the handle out of the eye.

SHAPE THE END of the handle with a plane or wood rasp to make it fit the eye. Cut a vertical saw kerf about 11/2" deep in the end. Drive the bandle into the tool's eye until it protrudes at the other end.

DRILL SEVERAL MOLES in the wood to break it up if you can't drive it out in one piece. (Use a metal-cutting drill in case it should bite into the metal wedges.) What's left after drilling should come out easily.

USE THREE WEDGES (some dealers include them free, others charge a few cents apiece), Drive a wooden one into the saw cut to expand the handle sideways, trim flush with tool, then drive two metal wedges across it.





WOODEN WEDGE

METAL WEDGES

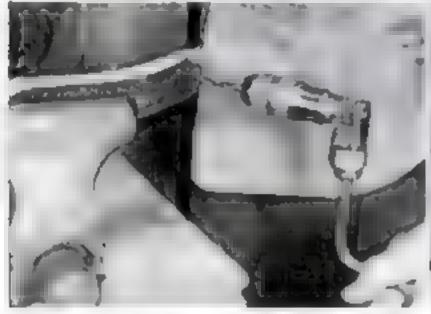
HAND' E END



centerpunch the rivet MEADS, drill them off, and drive the rivets out to remove the old handle. Use a metal-cutting drill about half the diameter of the rivet head to avoid enlarging rivet holes in the ferrule.



stleCT A NEW HANDLE to match the size and shape of the old one as closely as possible (replacements also come with "D" handles). Shape the end to fit the curve of the metal ferrule. Make frequent trial fittings.



CLAMP THE FERRULE on the handle and hold parts together in a vise. Using the holes in the ferrule as guides, drill one hole through the handle and insert a rivet to hold the position. Then drill the second hole.



PEEN THE RIVETS OVER on the ferrule, using the vise anvil to back up the hammer blows. Hammer out any kinks in the ferrule to make edges snug against the handle. Hammer out dents or bent edges in the shovel.

How to install tapered-end handles



SOCKET FERRULES are common on long-handled garden tools and woodworking chisels. A screw will secure the handle of the garden tool above. The chisel handle, driven note the socket, is held by the taper only.



POINTED TANG, which is driven into the handle to expand the wood against a tupered shell, is found on many garden tools. Some replacement handles come with a new metal shell, but save the old one until you're sure.

The POPULAR SCIENCE Shop Notebook

Clean power-tool tables regularly for smooth operation. Remove dirt, gum and grease with lacquer thinner. which cleans and dries quickly. Then apply paste wax to the metal surface and rub it to a high polish. This treatment will produce a sleek surface that lessens friction and decreases the pressure you must apply to move work over it, thus reducing the danger of hand slippage. The wax will also prevent corrosion and keep your tools looking bright and new.—R. J. De Cristoforo, Los Altos Hills, Calif.



To get a straight cutting face on a narrow tool bit, place a dummy bit about 2" away from it in the tool-post turret or bench vise and elevate it to the same plane. Lay an oilstone on both tool bits and work it back and forth across them. The long bearing surface of the two bits keeps the stone from rocking.—Frank LaSaracina, New York City.

To remove dried paint spots from your hands (usually discovered after you wash up) apply a drop of your wife's nail-polish remover and let it stand on each spot for a few minutes. The remover will soften the dried paint, and you can easily wipe it off.—M. Robert Beasley, Jackson, Mich.

Flip up the covers of oil cups with a small washer soldered on an oil can's spout about \(^1/4\)" from the tip. With the washer holding the cover back, you'll find the tip in the right position to deliver oil to the cup, making oiling a one-hand job.

When cutting threads in a lathe, the position of the tool bit is critical. You can get on-the-nose settings with a centering gauge made from two collars beveled 30° and mounted on a mandrel held between centers. Slip the collars on the mandrel so that the beveled edges come together to form a 60° V groove. Then adjust the cutting tool until it fits in this groove. It will fit perfectly only when it is square to the work and also at the proper height.—

H. J. Gerber, Stillwater, Okla.



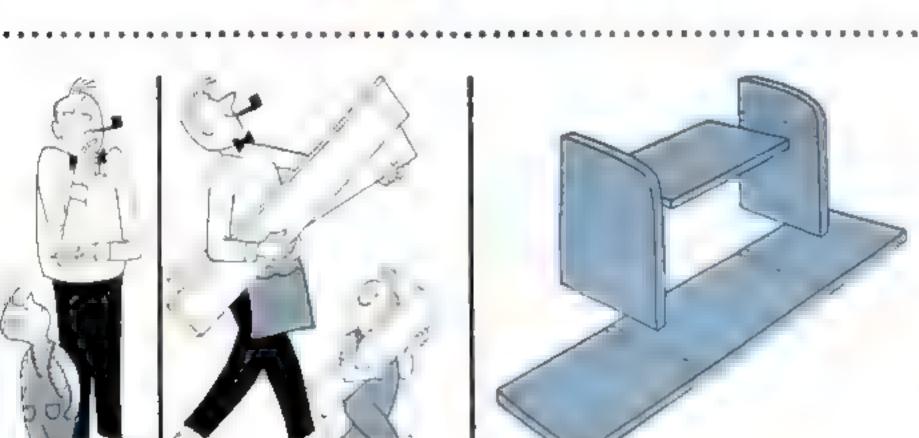


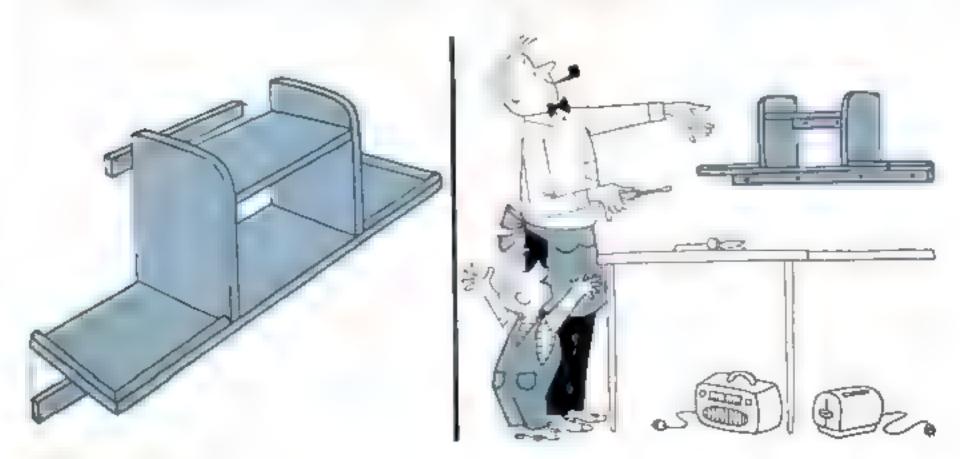
FEBRUARY 1958 201

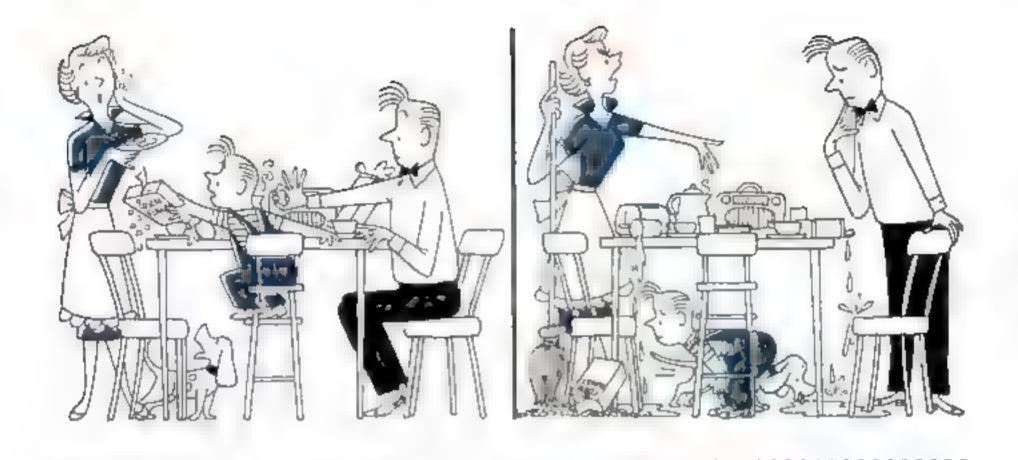


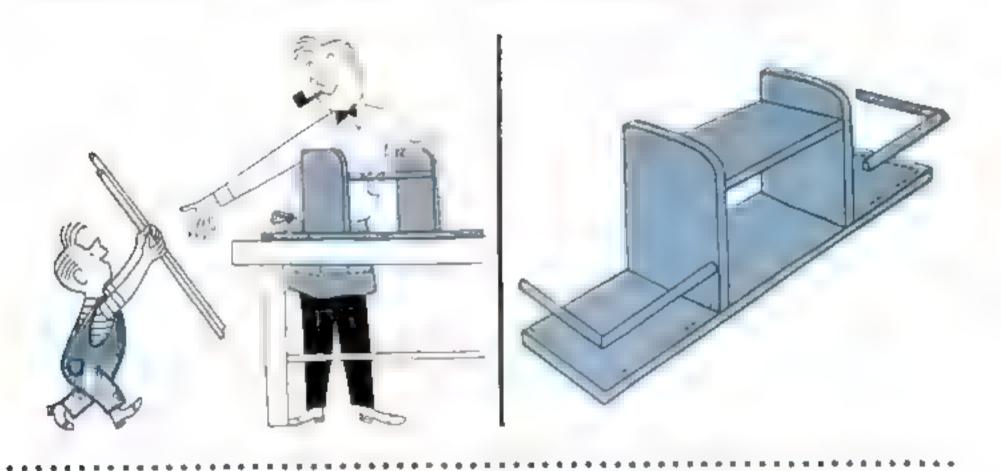














Next Month: A lighted telephone pad for easy note-taking

FEBRUARY 1958 203

Hi-Fi and Electronics

Do jiggles and pops mar picture and sound reception in your neighborhood? Here's how to get rid of them

By Jack Foster

chors aweigh, my boys, anchors aweigh," I sang lustily, if a bit off key, while running a sanding disk over a boat hull, my current weekend project.

"Stop that noise!" It was my wife shouting from the back porch. "Do you hear

me, Jack?"

"Yes, my dear. Is it all right if I

just hum?"

"You can yodel your head off," Madge said, venturing through a drizzle to the garage where I was working. A smile took the sting out of her words. "Your motor's causing the trouble, not you. It's coming in fine on TV. Mother and I prefer something more entertaining."

"Not TV interference again?" I protested, snapping off the rotary sander. "That's why I moved the shop out here. What do you want me to do, go under-

ground?"

"No, dear, but you might try handsanding."

"What?"

"Never mind, just be sure you don't use the portable saw, either. That comes in on every TV set in the neighborhood."

Madge is given to exaggeration. It's just that when Mrs. Perkins across the street squawks, it sounds like the whole neighborhood.

"Maybe you could find some nice, quiet gluing to do," she suggested sweetly and

ran back into the house.

Since I had promised Madge that my power tools would not interfere with TV, I had no real comeback, I decided to take

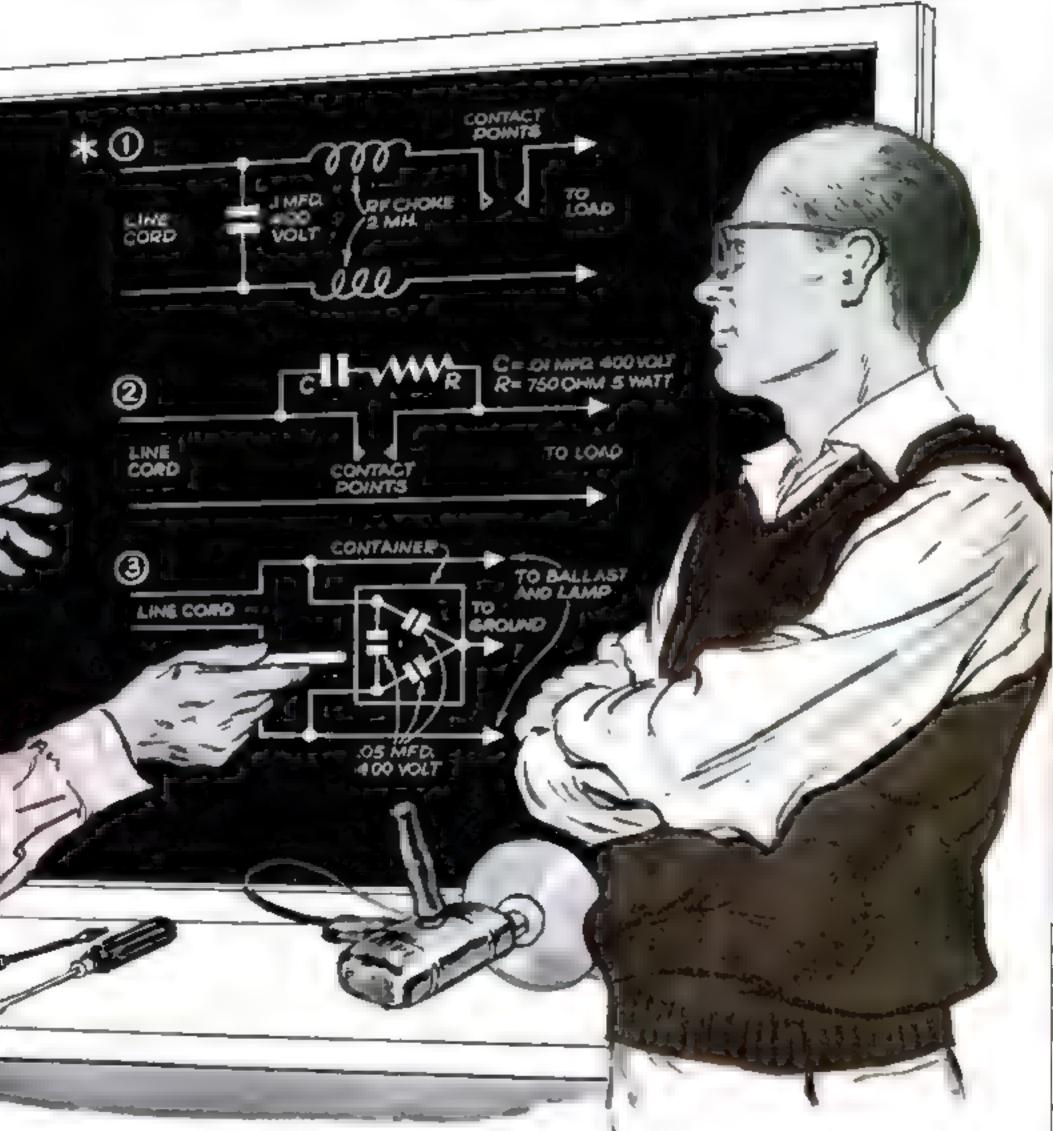


*What the circuits on the blackboard mean

Circuit No. 1 shows a filter for such low-power devices as shavers and doorbells. The size of choke limits the power that can be handled. RF chokes of various current ratings are sold by radio-parts stores. Use 400-volt paper or mica condensers for all filters. Circuit No. 2

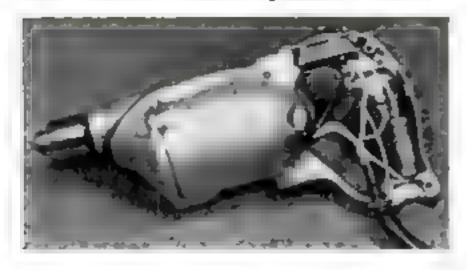
is the preferred filter for low-power equipment requiring installation across contact points within the appliance. No. 3 is for fluorescent lamps up to 60 watts. Filter should be installed in the lamp housing near the ballast. Don't use large-capacity condensers.

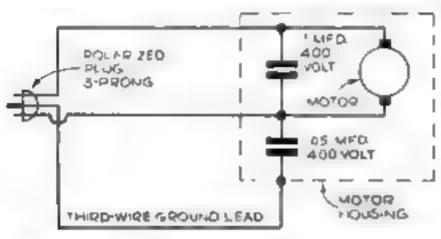
The Remedy for TV Interference



"Filters properly used will do the trick," said Cam Evans, rapidly sketching circuits on his chalkboard.

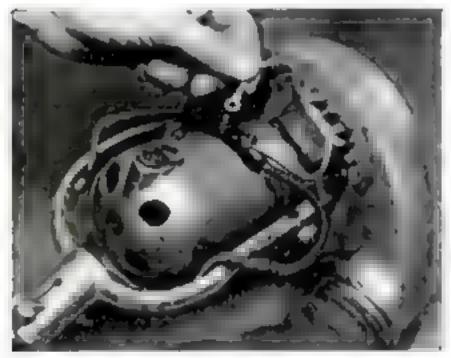
For metal-housed power tools

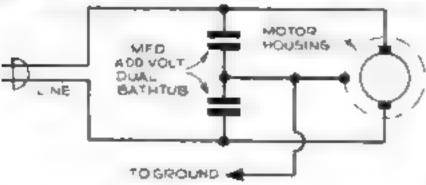




INSIDE THE HANDLE is the best place for powertool filters. If space is cramped try the new midget condensers. Insulate condenser and leads so that they cannot short against frame. Use a ground lead. These condensers are suitable for all motor-driven home appliances.

For external mounting





READY-MADE FILTER UNITS are provided by metal-cased "bathtub" condensers, Dual unit shown here filters both sides of the line. Use a ground lead to the motor housing. Connecting condensers to frame may create a shock hazard if exposed metal is not properly grounded.

my troubles to my electrically minded neighbor, Cam Evans. I found him in his basement workshop.

"About Mrs. Perkins." Cam said when I had unloaded my problem, "she has an indoor antenna, making her set more sensitive to interference because of its weak signal strength. A filter or two should make everyone happy."

Plug-in filters, "It's Mrs. Perkins who needs a filter to keep her from interfering," I said irritably. Then, "As a matter of fact, Cam, I have been thinking of putting a plug-in filter on my TV."

"I don't know, Jack; they only filter

the power that's feeding the set."

"So what? You're not trying to tell me that electrical impulses from a power tool can be picked up by a TV antenna?"

"Over a short distance, yes," said Cam "A brush-type motor can generate a pretty strong signal. And with the power line for an antenna, it's a cinch to be picked up by a TV antenna close by."

"How about a filter at the shop outlet?" "Might help in mild cases," he said.

"A filter at the motor is best, though." "But look, Cam," I argued, "a filter

at the receptacle would isolate interference from the power line."

"Sure," he agreed, "But you still won't be doing anything about the motor cord, and that can radiate enough signal to foul up TV reception."

I should have known better than to argue. Cam hasn't spent years troubleshooting for the local power company without learning the answers.

Our talk was interrupted by Bud Nolan. Cam's teen-age shadow who aspires to become an electrical wizard. He was holding a small radio in one hand.

"Hi. Cam, Hi, Mr. Foster," he called, waving with his free hand. "Not butting in, am I?"

"You are," said Cam. "But genius has its privileges, so get it off your chest."

"Okay. Listen to this." He put the tiny radio on a bench and plugged it in. "Built it with my own little soldering iron," he said proudly. As music came on to a background of uneven popping, Bud's smile turned to a frown. "Darn those beeping space satellites," he said.

"Guess again, Bud," said Cam.

"I know I was only kidding." Bud glanced at the overhead fluorescent lamp "It isn't the light or a motor. They cause

206 POPULAR SCIENCE

Where to Look for TV and Radio Interference and What to Do About It Symptom Probable Cause Remedy

Rasping noises in sound, dots and streaks in TV picture

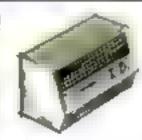


BAUSH-TYPE MOTORS

Portable power tools, vacuum cleaners, food mixers, sewing machines

Ctean commutator, install new brushes, put in condenser-type filter. CAUTION: Use no larger than .05 mfd. condenser to ground. Be sure all exposed metal housings are securely grounded with separate ground wire

Rasping or popping holses; dots and streaks. Picture may flip. Usually occurs during starting cycle only



INDUCTION-TYPE MOTORS

Air conditioners, refrigerators, furnace blowers, washing machines, dryers Bond motor to frame, install direct ground, check for loose connections, check starting mechanism

Clicks, popping noises in sound. Picture may flip in weak signal areas



THERMOSTATICALLY CONTROLLED HEATING DEVICES

Electric Irons, coffee pots, skillets, heaters, blankets, pads Check line cord and connections. Install choke-type fister at outlet. Put in condenser-resistor filter across contact points of thermostat

Roar with distinct lowpitched hum when furnace comes on. Streaks and flipping in TV picture



GIL-BURNER IGNITER

Bond motor, burner and furnace. Install choke-and-condenser filter on igniter

Frying noise. Sait-and-pepper effect in TV picture of nearby sets using indoor antennas



DOORBELL

Install resistor-condenser filter across contacts at bell. Replace transformer if defective

One or two dark, snaky lines across the picture, usually on only one channel



OLD TYPE TUNGSTEN LAMP

Replace with modern bulb

Popping or crackling noise in AM radios, Flashes and streaks in TV picture



BELT STATIC Any belt-driven device

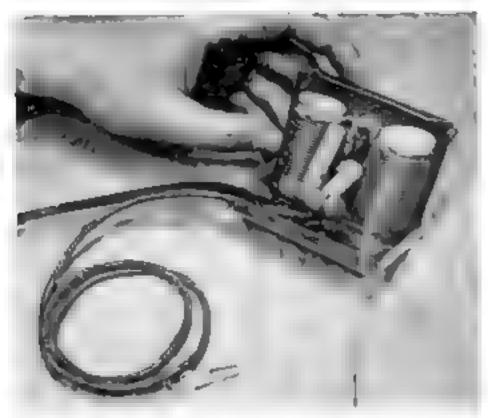
Bond machines together with heavy conductor and ground. Apply thin film of graphite to belt

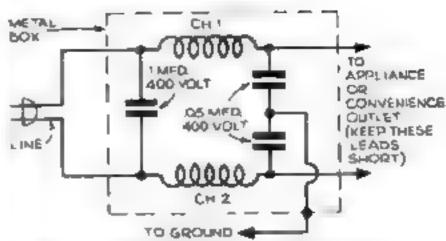
Rasping or frying noises in AM radios. Overall sandpaper effect in TV picture



FLUORESCENT LIGHTS Replace starter and fluorescent tube. Install condenser-type filter in lamp housing. Use special commercial filter in severe cases

Combination choke-and-condenser filter fits in box





EVEN STUBBORN CASES of TVI will usually be cured by this combination choke-and-condenser filter. House in a separate box. Chokes I and 2 in circuit above consist of 18' of No. 20 enameled wire wound around empty thread spools. Filter is suitable for appliances requiring not more than 500 watts, If the nower demand is greater, use larger size wire.

a steady buzzing." He scratched his head. "Got it! Mrs. Cam is using one of her automatic electric gadgets."

"Good try," Cam agreed. "Some thermostat-controlled appliances do cause radio popping. But you aren't even warm —and that's a clue."

"Warm-furnace?" I suggested.

"Too easy, Mr. Foster," Bud said. "That's an induction motor Cam's got running the furnace blower, and they don't cause radio interference-much."

"Right," Cam agreed. "How about the

drive belt?"

"Static!" Bud was elated, "That's it-

static discharge from the belt!"

Discouraging static. Cam nodded. "I was just about to fix it. A thin film of graphite on the belt, and a good ground on both motor and blower will discourage the static build-up."

"How about power lines?" I asked knowingly. "They get the blame for a lot

of static in radio and TV sets."

"Unjustly, Jack, unjustly," said Cam. "Power systems would come at the bottom of a list of interference sources."

"And what about tree limbs rubbing against power lines?" Bud chimed in.

Cam held up his hands, "Wait, now, you two. The power companies want you to get good reception. A lot of people who yell the loudest make their own interference. Out-of-date wiring, for instance, and a lulu we came across recently"

"Induction-heating equipment, I'll bet,"

Bud broke in.

An old-timer. "Not that simple," said

Cam, taking a clear light bulb, obviously an old-timer, from a drawer. "Not many of these straight tungsten-filament bulbs around, but just one of them sure can mess up a lot of TV reception."

"What's the story?" I asked.

"Well, a whole two-block area was complaining of wiggly lines across the picture. We had to make a house-to-house search before we found the culprit—this bulb. A woman forgot to turn it off in an attic."

"Interesting, Cam," I observed, "but wouldn't you say that shop tools are a more common cause of interference?"

Cam laughed. "Okay, I can take a hint." He put the bulb away and went over to his chalkboard.

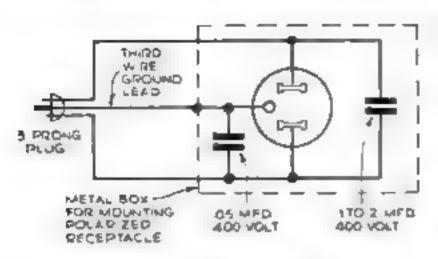
"Filters properly used will solve your TVI—television interference—problem, Jack," he began, sketching circuits as he talked, "No one filter is a surecure. Commutator motors are the worst offenders. especially if the brushes are worn or the commutator is rough. If cleaning the commutator and installing new brushes doesn't do the job, a filter will—in most cases a sumple condenser filter."

"What other kinds are there?" I asked Unknown source. "The combination choke-and-condenser filter used on equipment causing severe TVL" He pointed to a circuit. "A filter like this in the TV power cord will sometimes cure TVI from an unknown source if the power line is the carrier. But it takes a special antenna filter for disturbances picked up by the

Bud had been studying the circuits.

antenna."

An emergency filter for borrowed or rented tools



ALL-PURPOSE FILTER, assembled in a metal receptacle box attached to an extension cord, is good for use where installing a filter at the power tool is not practical. This make-do setup is not quite as effective as a built-in filter because the tool cord may still radiate some interference. Winding the cord and tying it into a short bank will help some.



"Don't those condenser filters need a grounding circuit?"

"That's right," Cam agreed. "It lets the filter condenser bleed off electrical interference generated in the motor. A direct ground improves the efficiency of most types of filters."

"But what if a tool or appliance can't be grounded?" I asked as Cam erased the circuits and drew some others. "Can you picture a woman bothering to ground her vacuum cleaner?"

"You've got a point there, but if the appliance still causes interference, simply reversing the line cord in the outlet will often do the trick."

Bud picked up his radio. "That's for me," he said. "Mom's sewing machine gives my radio the jitters."

The filter I put together that afternoon seemed to work, but before attaching it permanently to my sander, I brought it over to Cam for a check. Just as he finished running leakage tests, Bud came clattering down the stairs.

"It blew up," he announced excitedly. "What blew up?" Cam asked.

"The filter I put on Mom's sewing machine. It was a 20-mike electrolytic condenser in parallel with the brushes . . ."

"Oh, no, Bud," Cam broke in. "Not a 20-microfarad electrolytic?"

"Sure, Cam. The bigger the condenser the better the filter."

"Do you remember what condensers do in a radio?"

The boy pondered, and suddenly clapped a hand to his forehead. "Boy, am

I a dope. Why, that 20-mike job was practically a short circuit across the line."

When I looked puzzled, Cam explained, "Electrolytics are designed to be used only with DC. The reverse polarity from AC current broke down the insulating film in the condenser. And even if the insulation isn't ruptured, those big condensers can pass a lot of AC power."

"Then how can they filter anything?"

Condensers are choosy. Bud took the floor. "You see, Mr. Foster, condensers are choosy about the frequencies they'll pass. Small condensers act like an open door to pass off high frequencies that cause interference, but like a tiny crack when it comes to letting the 60-cycle power frequency through."

"Bud's right," Cam said, "Motor brushes create a high-frequency electrical surge in the power line every time they contact a commutator segment. Small condensers bypass these interference-makers to the ground before they have a chance to travel along the power line."

"Yeah," said Bud sheepishly, "I should have remembered that the frequencies a condenser will pass vary with its size."

"This is all dandy for you and Bud," I said, "but what about my problem?"

"Yours is solved, Jack," Cam said, handing me my filter assembly, "except for one thing."

"Oh?"

"If I know Madge, she'll want a filter on each of her appliances so that she won't miss any TV programs while doing the housework."



Rolls Rovce is known the world over as an automotive masterpiece. Like 35 other great makes of cars, Rolls Royce uses Champions.

Q. Why do over twice as many car makers—including Rolls Royce—specify Champion spark plugs?

A. Champions give <u>full-firing</u> power.
Put new Champions in <u>your</u> car every 10,000 miles. You'll get an *immediate* boost in horsepower...and save gasoline, too!

World's Savonte spark plug on land, on sea, and in the air





Study these 10 statements, then test your car sense by marking them "true" or "false"

When an engine equipped with automatic choke does not start right away, keep pumping the gas pedal to prevent flooding.	TRUE	FALSE	Grankcase oil should be drained while it is warm, and after a car has been run.	TRUE	FALR
If you are abreast of a car you intend to pass and suddenly find the road is not clear, let up on the gas and apply the brakes, instead of	TRUE	FALSE	When tires check about four pounds over the recommended pressure after being driven at highway speeds on warm days, do not reduce the pressure.		FALSE
trying to shoot ahead.					
3 Lubricating oil should be changed more frequently in dusty conditions.	THE	enta	If most of your driving is in stop-and-go traffic, and you take it easy on the high- ways, your car can use spark plugs that are a little hotter than normal.		FALSE
When an engine "pings" under acceleration, it is giving full power.	THE	FILSE	9 During warm weather it is a good idea to fill the gas tank at the end of a day.		FALSE
5 After a long, hard drive, it is good practice to let the engine idle for several minutes before you turn off the ignition.		FALSE	Driving today's high- compression, high-horse- power cars above 60 m.p.h. is poor economy.	TIME	FALSE

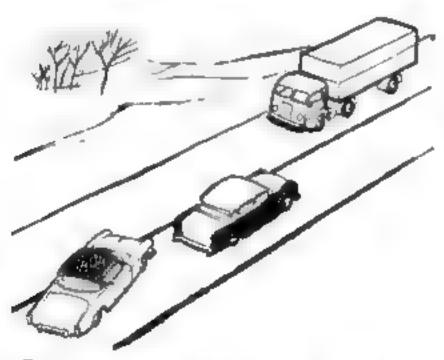
Now score your driving IQ. For the answers and the "reasons why," turn to the next three pages



Knowing the right answers can add to your

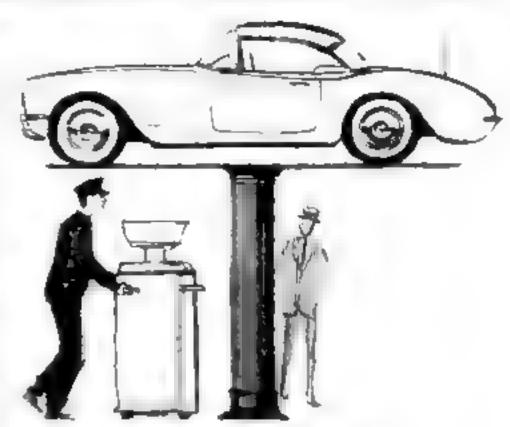
FALSE. Priming more than once or twice with the gas pedal floods the engine, making it impossible to start until the excess gas is cleared. To overcome flooding, push the gas pedal clear down while using the starter. This will "unload" the choke valve enough to allow air through the carburetor without picking up excess gasoline. The unloader is built into the carburetor and functions when the throttle is opened wide.

If the car is still flooded and refuses to start, hold down the gas pedal but stop cranking the engine. If your starter works with the foot pedal, turn off the ignition. Wait a few minutes and use the starter again. By keeping the gas pedal down, you do not pump gas into the engine while depressing the accelerator to use the starter. Never crank the engine for more than 25 or 30 seconds, as this may heat and damage the starter. Never let the starter run the battery clear down.



2 TRUE. Using the brakes and reducing your speed makes it possible to
get back in line much quicker than you
could squeeze ahead with full throttle.
Braking power is far greater than accelerating power at passing speeds. By reducing your forward speed, you lessen the
impact in case of collision. Also, if you
try to crowd ahead you may cut off the
car you are passing and cause a threecar pile-up.

There is one exception. If you see that the driver of the car you are passing is aware of your danger and uses his brakes to slow down, then use full power to slip in front.



3 TRUE. Dust is an engine's worst enemy. If you regularly drive over unpaved roads, dust gets into the engine through the air cleaner and crankcase breather, and eventually mixes with the oil. Only by frequent oil changes—as often as every 500 miles—can you be sure of minimizing engine wear caused by dust's abrasive action. Filters, too, should be changed more often than recommended under such driving conditions.

The second menace to an engine's long life expectancy is contamination of the oil from condensation, producing lowtemperature sludge. If you use the car only for short trips of a few miles to and from work, or for stop-and-go city driving, oil should be changed once a month, even if the mileage is as low as 100 between changes. The more times an engine is started and has to warm up—especially in cold weather—the more the oil is diluted by condensed vapors. An occasional run on the highway will evaporate these vapors before they form harmful acids, so when short trips are combined with highway travel now and then, oil changes can safely be stretched to 1,000-mile intervals.

If your average trip is 20 miles or more at speeds that keep the engine operating at normal running temperature, the mileage between changes can be upped to the factory-recommended intervals of three to five thousand miles, depending on the make of car. Under these conditions, use a top-grade oil, and change the filter at least every other oil change.

driving pleasure, save money and accidents

FALSE. An engine "ping" or "knock" means not only that it is wasting power, but that the moving parts are being overloaded. The sound is caused by too rapid combustion of the gasoline, which detonates, or explodes, instead of burning. A sudden jolt is imparted to the piston without any follow-through for the power stroke. This results in terrific pressures, increasing combustion-chamber temperatures that can harm valves, pistons and rings, as well as spark plugs and rod bearings.

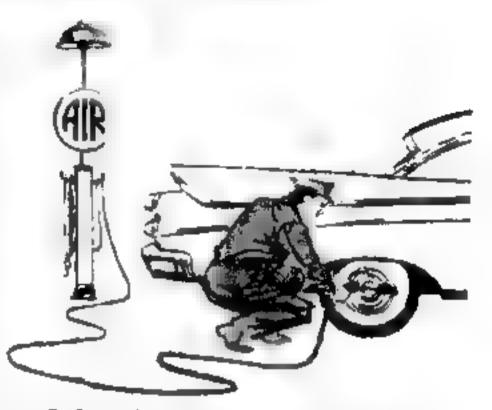
There are several ways to prevent "ping." Shift to a lower gear; use passing gear on hard pulls; change to higher-octane fuel; reset the ignition timing. If your engine is heavily carboned, it may be necessary to remove the head and clean out the combustion chamber.

5 TRUE. A short idling period gives the engine a chance to get rid of the extra heat developed during a hard drive. An idling engine creates less heat than one at higher speeds, under a load; and it cools down naturally. Uneven cooling of metal when a hot engine is shut off may cause damage to valves and other internal parts.

If the temperature gauge registers overly hot, stop the car facing into the wind, raise the hood, and let the engine idle until the gauge drops. Check the coolant level to see that it's not low.

6 TRUE. Driving a car for at least half an hour, and longer in cold weather, warms and stirs up the oil. This mixes the loose particles of dirt and carbon, and keeps moisture and acids suspended, so that they will all drain out with the old oil. The main reason for changing oil is to get rid of these harmful substances, and the more that can be drained out, the better service you will get from the new oil. It will have less initial contamination.

TRUE. Tires build up pressure at high speeds and during hot-weather driving. This is a normal condition and so long as the tire pressure was correct at the start of a trip, the increase in pressure should not be reduced.



Inflate tires to the recommended pressure when they are cool. Ordinary driving friction will raise the pressure about two pounds. After a fast drive, correctly inflated tires will check four to five pounds over cool pressure. So if your tires need air after you've been driving around town, put in about two pounds more than recommended. On a highway trip, if tires seem low or squeal excessively on turns or when braking, add an extra four pounds. Otherwise the pressure will be too low when the tires cool.

8 TRUE. To perform efficiently, spark-plug firing tips must operate within a specified temperature limit. Slow town driving, with idling in traffic, may drop the firing-tip temperature low enough to be within fouling and carbon-forming range. If you don't do much fast driving, which would burn away these accumulations, frequent cleaning will help prevent misfiring, and the next-hotter plug will give you longer and more efficient service. A hot plug with its longer firing tip cannot dissipate heat as readily as a short-tipped plug, and carbon deposits burn off at lower cylinder temperatures.

The fouling condition results in dark, dry carbon formation on the electrodes, insulator tips and metal parts, unlike oilfouled plugs, which have a wet, oily carbon on the exposed parts.

If you drive mostly in city traffic, and don't speed on the highways, your car probably will do better with plugs one step hotter than recommended for normal driving.

Good driving habits add to your car's life



9 FALSE. Filling the tank at the end of a day may save you a few minutes on the next morning's start, but it will come out of your pocketbook. Gasoline expands during the heat of the day. When it cools in your tank at night, it will shrink, and in the morning you'll have less than you paid for, even though the full number of gallons were pumped in through the meter.

TRUE. Although today's cars will maintain high road speeds, it is still poor economy to go faster than 60 m.p.h. Gas mileage is sacrificed for speed and power when you push the needle much

over 45. Your car may give 18 miles to the gallon at a steady 30 m.p.h., but drop to around 12 miles to the gallon at 60. Above that speed you put more wear and tear on the brakes, and every time you use the brakes some of the gas mileage you paid for is eaten up. Then, as you open the throttle, gas pours through the carburetor and more mileage goes out the tailpipe.

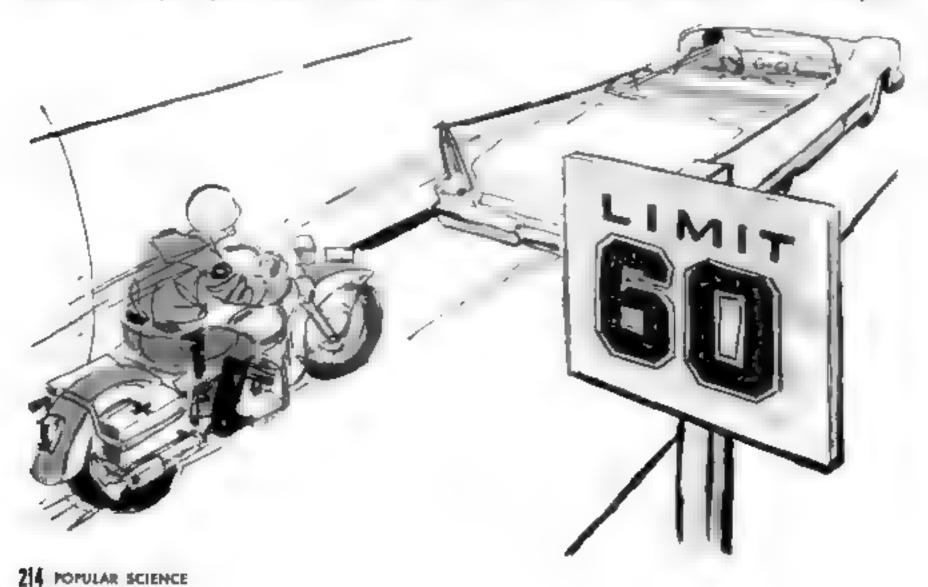
Faster tire wear is another penalty of high speed, both from increased friction and the greater amount of accelera-

tion and braking.

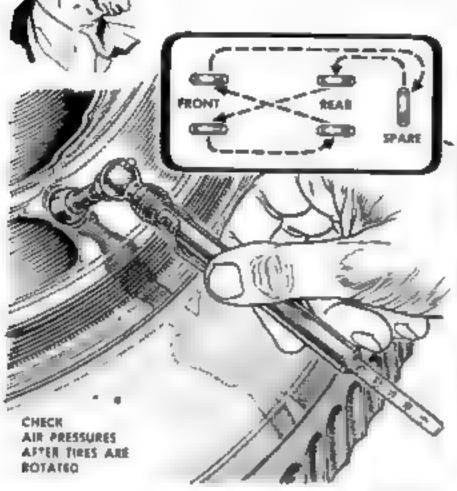
Safety, translated into terms of doctor and repair bills, is another factor. With a powerful and easy-riding car, the speedometer can climb to 70 or 80 before you know it. Too late you may find yourself without room to stop, or approaching a curve at a speed too great to hold the car on the road.

Then, too, high-speed driving uses up more oil, and deceleration pumps extra oil by the piston rings; moving engine parts get more wear; the chassis takes a greater beating.

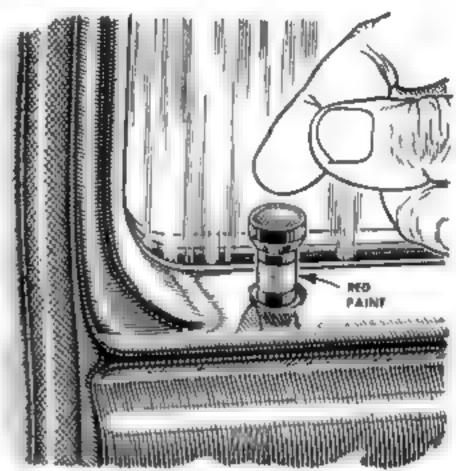
It is poor economy to pay this extra cost of fuel, tires and repairs, while taking unnecessary chances. You can still make good time on the highways without topping 60 m.p.h.—Robert V. Thompson.



Hints from the Model Garage



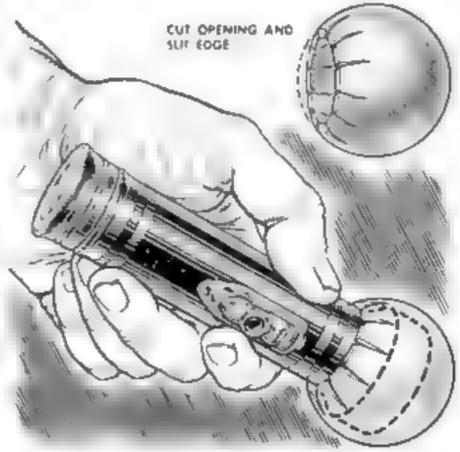
After switching tires, remember to check pressure in the new position. Front tires should carry a few more pounds than rear, and rotating puts the softer rear tires up front (see rotation chart above) where they may prove to be underinflated.



Checking door-lock buttons to see that they're down can be done with a glance if you put a band of red paint or colored tape on them When the buttons are pressed down, the bands disappear If you can see a band, the door is unlocked.

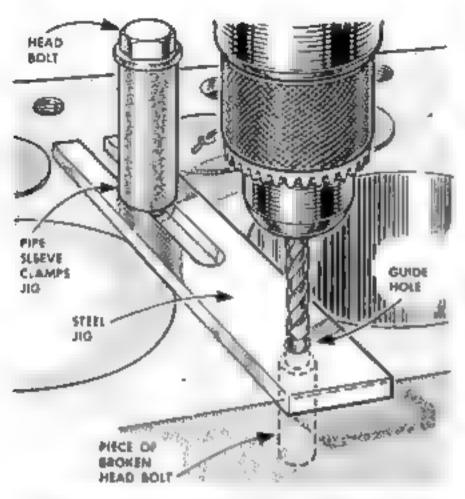


A good makeshift creeper for work beneath your car can be had from a large carton opened flat. It can be shifted about easier than papers or a cloth and the thick board gives your back protection from damp or greasy ground or concrete.

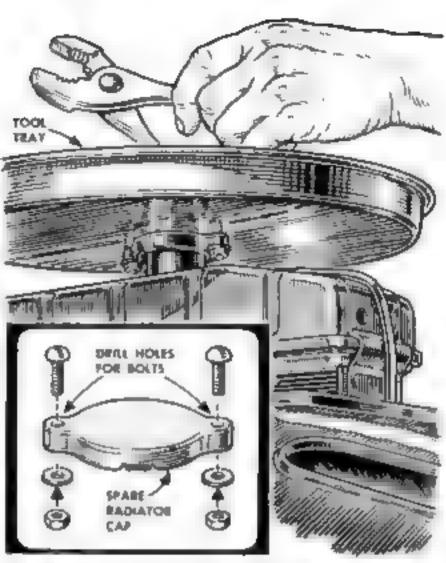


Cap the lens of a flashlight with a rubber ball to protect it while being carried in the trunk, glove compartment or tool box. Cut an opening in the ball, then slit the edge of the opening so it can easily be forced over the lens of the flashlight.

More Hints from the Model Garage



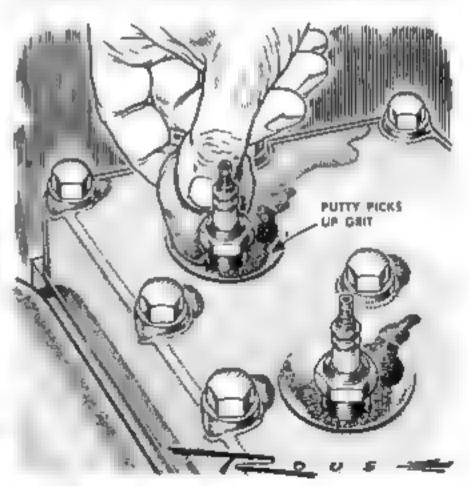
To drill out a broken bolt without damaging the threaded hole, clamp a simple jig under an adjacent bolt to center the drill. To make the jig, cut a slot in one end of a steel strip and drill a guide hole near the other end for the drill bit.



A tip-proof tool tray can be made by bolting a large pie tin or serving tray to the top of a spare radiator cap. Mounted on the radiator's filler neck in place of the regular cap, the tray is handy as you work in the engine compartment.

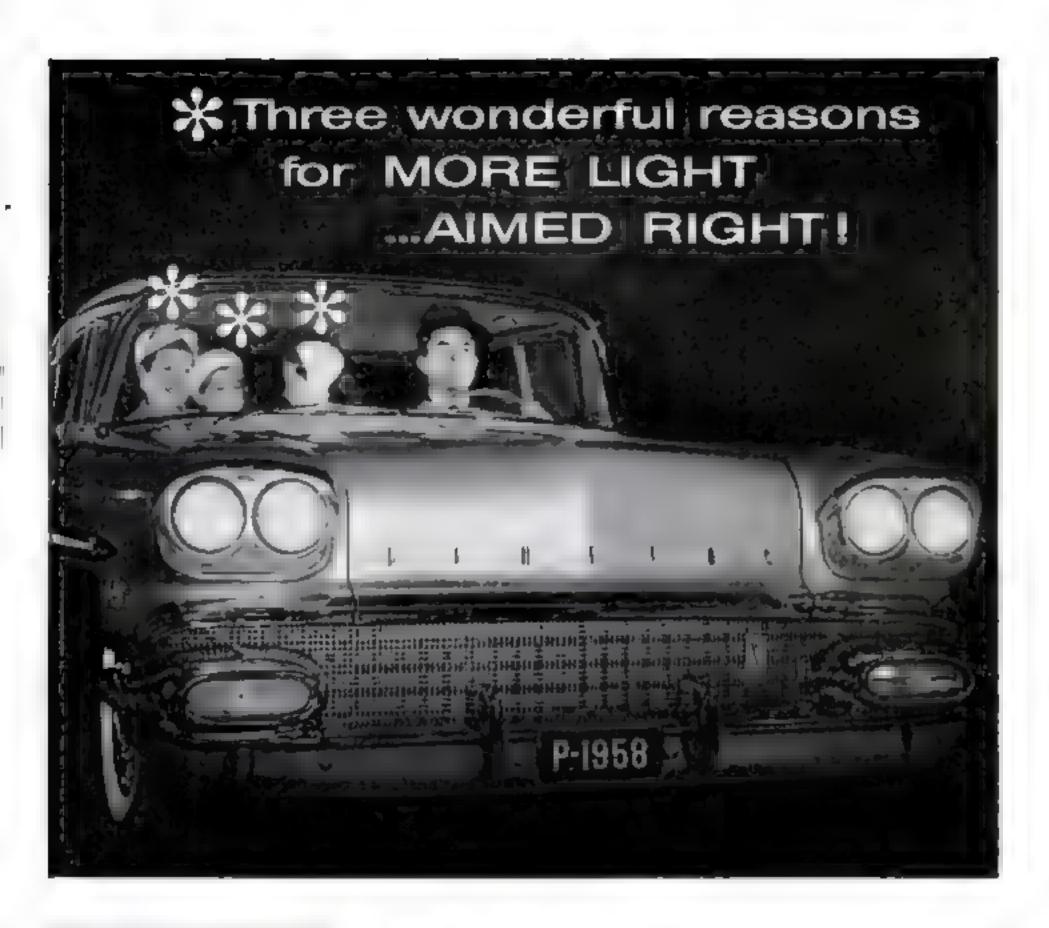


A coating of gasket compound over the protruding end of a bolt exposed to the weather will keep it rust-free and easy to remove. Protect license-plate bolts this way, and coat bumper-bracket bolts, fender and body bolts when new.



Pick up dirt and grit from spark-plug wells, so plugs can be removed without contaminating the cylinders, with a ball of putty or wallpaper cleaner. Press it in firmly, close to the plug. When you lift it out, the grit will adhere to it.

216 POPULAR SCIENCE





SAFETY-AIM HEADLAMPS

Buy in pairs where you see



Watch Walt Disney Studios' ZORRO every wask on ABC-TV Your family deserves all the safety you can provide . . . deserves the extra safety of new Guide T-3 Headlamps.

With Guide you see farther down the road because this new, industry-approved sealed-beam headlamp, introduced just two years ago, has stepped-up power plus a new light pattern which throws more light on the right—where you need it most.

But, most important of all, these new Guide T-3 Headlamps can be perfectly aimed in minutes—in broad daylight!

Three "Guide Points" on the face of each T-3 lens are ground to tolerances within one ten thousandth of an inch. This precision, and the simplicity of the T-3 siming method, assure you of MORE LIGHT—AIMED RIGHT... more safety for both you and your family.

If the headlamps in your car are two years old or more, have them replaced with new Guide T-3s now. And have your headlights aimed at least twice a year.

AC # THE ELECTRONICS DIVISION OF GENERAL MOTORS

Just overhauled by the town's new mechanic, Stafford's car was stone-cold dead at the market





Gus Gives a Competitor the Business

By Martin Bunn

plumber, was jubilant when he telephoned Gus Wilson at the Model Garage, to inform him that Oliver Stafford required his services. Stafford was out at the new shopping center, which had sprung up in the suburbs like a mush-room in lush soil

"I warned Stafford not to have his car overhauled by a Johnny-come-lately like Paul Ryberg," Walt crowed, "I tried to get him to take his work to you, but he wouldn't listen. Now his newly overhauled motor is out here on the shopping-center parking lot, stuck tighter'n a glacier in Alaska. Get out here fast, Gus, and take over."

"It seems to me," Gus said, "that the man to call is the fellow who did the overhaul. Why don't you give him a ring?"

"Are you nuts, Gua?" Sommers inquired. "You've been in the garage business around here for years and now these newcomers like Ryberg are out to cut your throat. This is your chance to show Ryberg up."

"What have you got against this man?"

Gus asked the plumber.

"Nothing," Sommers said. "Absolutely nothing. I hardly know him. But with all this new building in the suburbs, it's up to us old-timers to hang together. I'm a plumber and you're a mechanic. If we don't work together to beat down new competition, we're sunk."

"If Paul Ryberg did Stafford's overhaul," Gus insisted, "he's the man to call

in on this."

"That's just it," Sommers said exultantly. "Ryberg's away on vacation. Any-



way, Stafford's so mad about this now that he wouldn't call him if he could. In fact, he asked me to call you."

"In that case," Gus agreed, "I'll be right out."

WHEN Gus arrived at the shopping center he found that Stafford's stalled car was attracting considerable attention. People going in and out of the various stores were stopping to ask questions and offer advice. It occurred to Gus that if Paul Ryberg's overhaul job had indeed gone sour, he was in for a lot of had publicity. On the other hand, the

Model Garage, coming to the rescue in Ryberg's absence, stood to gain favorable attention

Walt Sommers smiled as Gus approached with his tool kit. "Here comes the fellow I wanted you to give your work to, Stafford, Gus, this is Oliver Stafford, one of our newcomers."

"Glad to meet you, Stafford," Gus said as he put down his kit. "Walt phoned me

that you were having trouble."

"That's right." Stafford's eyes held a glint of exasperation. "I had Ryberg do a complete overhaul—valves, rings, bearings, everything. And now, in less than a hundred miles, my motor gets hot and sticks. The starter won't budge it."

"You say that the motor got hot?" Gus

asked.

"Yes. I noticed that the heat gauge was in the red when I parked, but I sort of expected this with a tight motor. But I didn't expect the engine to be stuck tight when I came out from shopping."

"Maybe it isn't," Gus said. "Perhaps the starter gear is locked in the flywheel

ring gear. I'll take a look."

Gus pulled the starter and found it free. With the ring-gear teeth exposed, he tried to turn the motor by prying against the teeth with a bar. But the motor was, indeed, so tight that it was impossible to budge it. As he straightened from replacing the starter, he found himself ringed by currous shoppers.

He smiled to himself when he heard one of them say, "So that's Gus Wilson,

eh? I've heard he's a whiz."

Gus turned to Stafford. "You say the heat gauge was in the red when you parked? Modern engines don't usually heat up that much on an overhaul."

Walt Sommers spoke up loudly: "It depends who has worked on them. If you don't know your business, anything can

happen."

"US raised the hood, removed the radiator cap, peered inside.

"Hmm," he grunted, "Water's awfully low."

He got down on his knees, peering under the car, looking for leaks. Seeing none, he began to remove the spark plugs. Nothing happened—until he removed the third plug on the six-cylinder head. As he took out this plug, water spouted high as though under pressure.

"She'll turn over now," Gus said, wiping moisture from his leathery features. "You must have a leaky head gasket."

"Leaky head gasket!" Stafford exclaimed. "But how would that make the motor stick so it wouldn't turn over?"

"When you parked your car," Gus explained, "number three cylinder was about to come up on the compression stroke. It filled with water, probably from a leaky head gasket, while you were in shopping. When you tried to start the car, the piston moved up against the water. With a well-fitted set of rings and a perfect valve grind, so that the water couldn't escape, it would act about the same as a cylinder full of cement. Ryberg must have done a good job on those rings and valves."

Stafford grunted. "And how about the water in my cylinder?"

"It sounds like a faulty head gasket,"

Gus repeated

"Yeah," Walt Sommers commented. "Maybe Ryberg just forgot to tighten the head bolts."

As Gus turned, planning to fetch his tow car and take the car into the shop, his eyes met the interested and curious gaze of the ring of spectators, mostly new faces to the area. He hesitated, then stooped to pick up his long-handled torque wrench.

"It's possible," he said thoughtfully.

"Let's see."

He began to run the torque wrench over the head bolts, testing them for tightness. The center bolt of the middle row turned easily under his hand and lifted. Gus took it out. It was broken off.

"Hah," Walt Sommers said. "Some of these young, inexperienced bucks don't know their strength. Ryberg twisted that

head bolt right off."

"Maybe, but not probable," Gus said, taking his flashlight and peering down in the hole the broken bolt had come from "The stub end of this bolt shows a rust streak through the metal that indicates a flaw. I'd better tow you in to the shop, Stafford "

TN THE Model Garage, Gus faced the tricky job of removing the broken stub of the bolt from the cylinder block.

"How on earth will you get that out?"

Stafford wanted to know

"The usual way," Gus told him, "is to drill a hole through it and then screw in a reverse-threaded tool made of steel hard enough to cut into the broken stub and remove it. The only trouble with that method is that if you drill too large a hole in the broken end of the bolt, the tool will bulge the skeleton of the bolt and lock it in the cylinder-head threads. If you drill too small a hole you have to use too small a reverse-threaded tool to stand the strain of taking out a rusted-in head bolt. If you break the tool off you're really in a jam, since it is made of steel too hard to be drilled."

"Then how do you get it out?" Stafford

asked. "It seems like an impossible job."

Gus grinned.

"If a man's hand is steady enough," he said, "he drills a perfectly aligned hole down through the broken bolt end, just a hair smaller than the bolt. The remaining portion of the bolt is then so thinwalled that you can break it away from the cylinder-head threads with a fine chisel. Then you can take it out with the end of a rat-tailed file."

"You sure know your business, Wilson," Stafford said as he watched Gus delicately remove the broken stud bolt Stafford spoke thoughtfully: "It seems to me that you are either a very square guy, Wilson, or you don't want any more business."

"I want all the business I can get," Gus told him, "but not by digging at a competitor's reputation. I wouldn't know Paul Ryberg if I met him face to face, but I do know the bad publicity a thing like this could bring him in a new community. It could put him out of business."

Stafford countered, "And give you

more business."

"Probably," Gus said. "For a while.

But this area is growing so fast that we need all the skilled help we can get. Folks expect services when they move to a new place, and if they don't get them that place stops growing. In the long run, putting the skids under a fellow like Ryberg would cause me and everyone else in the community to lose. The way I see it. his coming here is progress."

"I guess it is, at that," Stafford conceded, "If folks who move here don't get the services, they'll stop coming. Maybe Sommers didn't think of that. By the way, I hear Paul Ryberg's brother is coming, too, to open a shop in town"

"You don't say," Gus said. "Do you know what line he's in?"

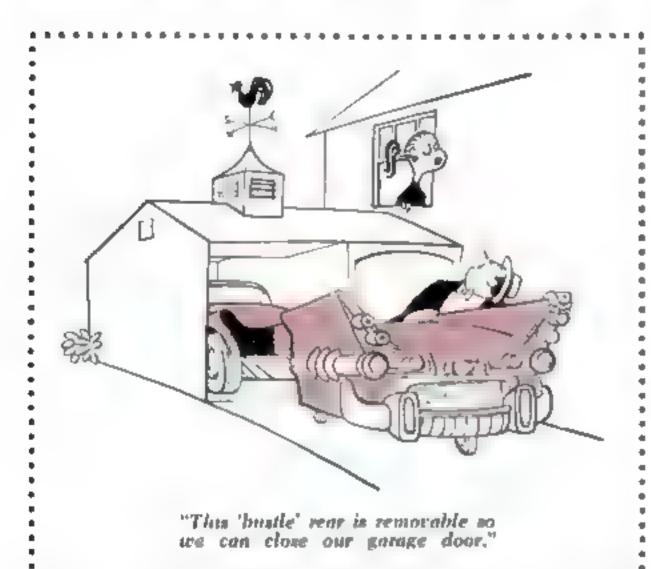
"Yes, let's see—Ryberg told me." Stafford's eyes suddenly widened as they met Gus's. "Come to think of it—his brother is a plumber."

"I see," Gus said, and he did see very clearly.

He drained Stafford's car of oil, to make sure there was no water in the oil pan, and set about installing a new headbolt stud and gasket.

As he worked, his mind drifted to Walt Sommers. Some folks, he thought, are scared of progress when it starts getting close.

Next Month: Gus does it by the numbers.



from the cylinder head, "Walt Sommers warned me that Johnny-come-latelies are dangerous, in plumbing or in auto repair. I should have given you my work."

"I'd have been happy to have it," Gus said, "But it seems to me that Ryberg did a good job, My torque wrench showed that the rest of the head studs were tightened to 60 foot-pounds, as the factory specifications for this car recommend. Ryberg would hardly bear down on this one bolt and break it off. Since we know from the rust streak through the metal at the break that there was a flaw in that stud, which Ryberg couldn't have known about or prevented, I hardly see where he can be blamed."

Transistors power Servo-System Hi-Fi

FACTORY-SEALED timer backs up A a guarantee of 2,000 hours of satisfactory performance for a new hi-fi speaker-amplifier unit, That's about five years of normal operation. The timer operates only when the unit operates and will show at any time whether the guarantee has been met.

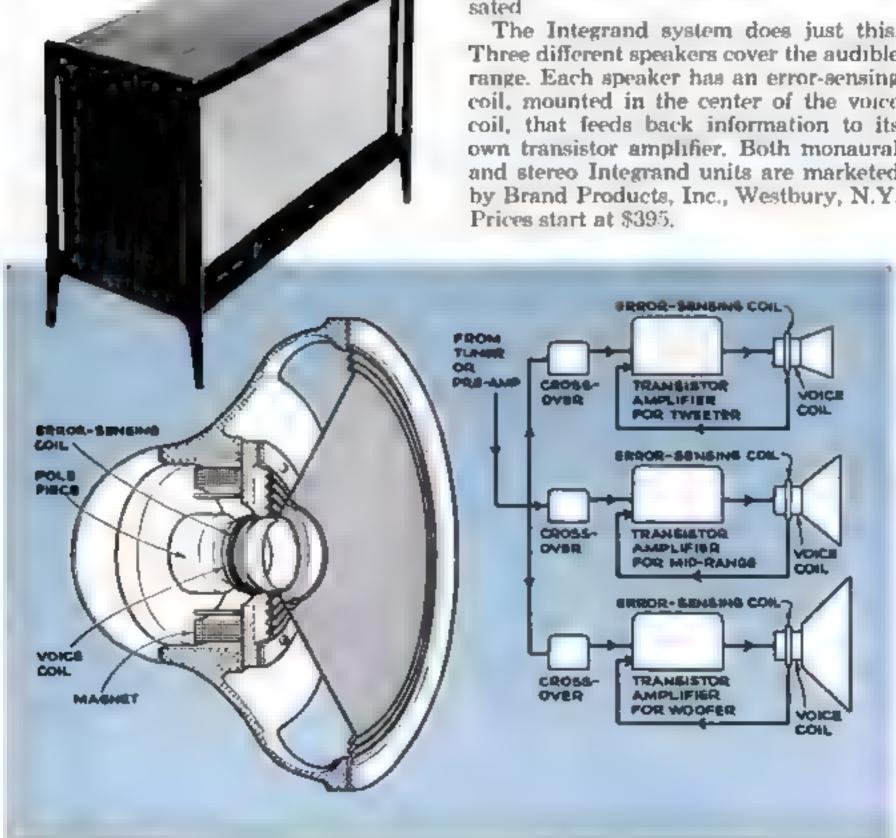
Performance specs are impressive, too. The maker guarantees response within three decibels from 35 to 16,000 cycles at less than one-percent distortion for one acoustical watt output (about 20 electrical watts)

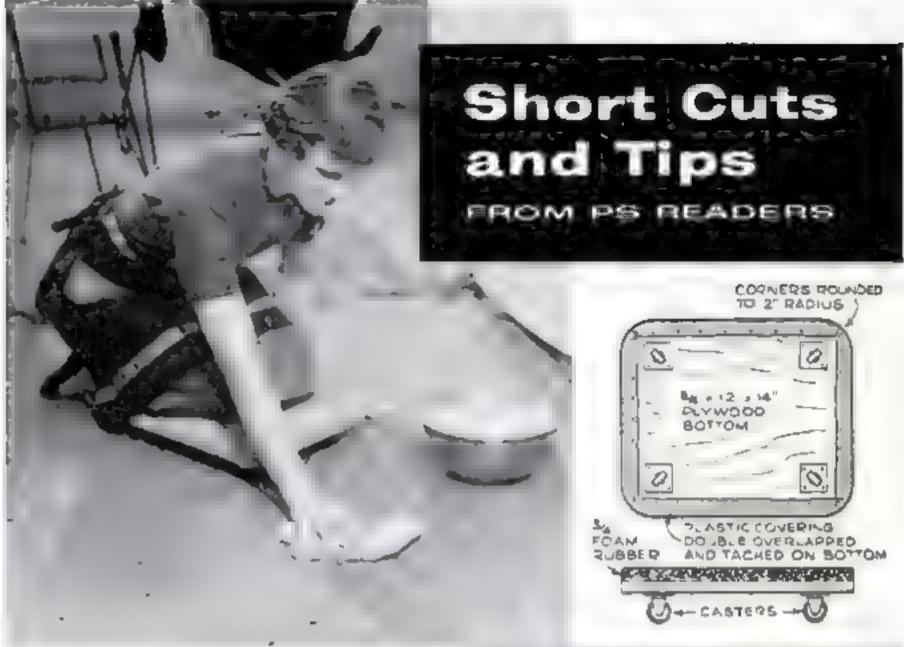
This new integrated sound-reproduc-

tion unit incorporates an unusual concept. It combines the functions of amplifier. loudspeaker and enclosure in one electroacoustic network.

Transistors and a new speaker have made a commercial reality of a system long considered theoretically desirable by engineers. Theory: If you can get exact information about the sound being produced by a loudspeaker, this signal can be fed back to the input of the driving amplifier and compared to the original signal. Any differences in the two signals would be due to error on the part of the amplifier or loudspeaker. This error signal can then be incorporated in the incoming signal in such a way that any shortcomings are continuously compensated

The Integrand system does just this. Three different speakers cover the audible range. Each speaker has an error-sensing coil, mounted in the center of the voice coil, that feeds back information to its own transistor amplifier. Both monaural and stereo Integrand units are marketed by Brand Products, Inc., Westbury, N.Y. Prices start at \$395.





Knee Pad Can Roll Around Floor

My WIFE gives the kitchen floor a thorough scrubbing in relative comfort by kneeling on the cushioned dolly I made. We move heavy objects with it, too.

I glued a foam-rubber pad to a 12"-by14" platform of ¾" plywood. The platform's corners were rounded to a 2" radius. Over the trummed rubber pad I
stretched plastic upholstery material and
doubled the edges before tacking them
down. Four swiveling casters went on the
bottom.—Ronald Anderson, Minneapolis.



Could You Use This Idea?

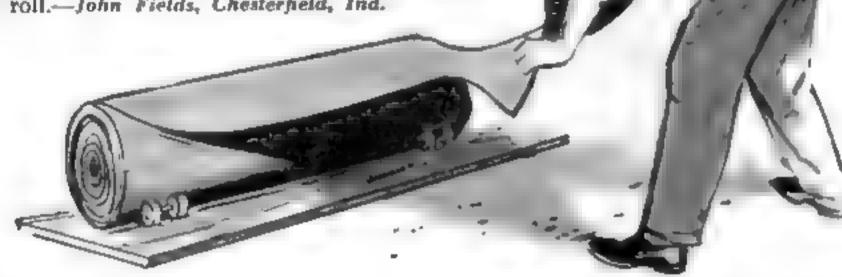
Too much noise from a workshop or recreation room? You can muffle the sound effectively with perforated hard-board panels backed by glass-fiber insulation blankets.

Laboratory tests made for the Masonite Corporation indicate that these two common materials provide a satisfactory measure of noise reduction compared with common acoustical material. The panels used were ½" Peg-Board with ½" holes spaced on ½" centers. The glass-fiber blankets can be placed between furring or wall study and the hardboard panels nailed over them. Painting the panels doesn't affect sound-deadening ability, it is claimed.



Heavy Roofing Rolls on Skates

Handling heavy papers and roofing felt is a lot easier when the roll is cradled by a pair of roller skates. I nail the skates upside down to a board, adjusting the distance between them to balance the roll.—John Fields. Chesterfield, Ind.



▶▶▶HERE's a way to speed up frequent shifts of garden hose from one faucet or sprinkler to another. Put several extra washers in each coupling as spacers. Doing that leaves less thread to be engaged.

—John Cavanaugh, Monterey, Calif.

I FOUND that the carburetor cleaner used in garages will dissolve India ink quickly and completely. To keep drawing pens clean without scraping them, I dip the points in cleaner and wipe them dry with a cloth.—John Nestler, Tampa, Fla.



Simple Plug Repairs Leaky Tank

SMALL leaks in metal containers, such as water tanks, are easy to repair. Slip a couple of washers over a sheet-metal screw and add a large rubber disk cut from a scrap of inner tubing. Screw the plug in tight. The pressure of metal washers on the rubber will insure a permanent seal.—Frank Javor, Newark, N.J.

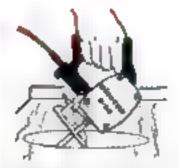


Punch Turns Out Index Tabs

THESE index tabs are economical to make and they stick to anything. I type numbers on gummed paper, such as a label, and cut them out with a large paper punch. For contrast or special keying, I use colored paper. The tabs are handy whenever I want to sort or file something in a hurry.—Fred Jenkins, Deal, N. I.

Zips through 2 x 4's ... cuts 1/4" steel plate ... cuts 1/2" aluminum plate

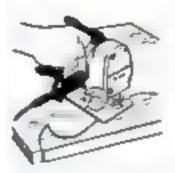




Plunge cuts without a drilled hole!



Cuts through hardwood 2 x 4's at 45" angle!



Cuts intricate figures In all materials l



Detachable electric cords come in lengths up to 100 ft.!

NOW! THE WORLD'S MOST USABLE POWER SAW!

The revolutionary Disston D-23 Electric Handsaw!

This brand-new multi-purpose power saw enewers the crying need of home workshop owners everywhere. It gives you—in a single professional tool—a whole shopful of power saws. Weighing only 4½ pounds, it does more cutting jobs than any other saw of its kind. Rips, crosscuta, mitres, bevels, ecrolis. Does heavy workhorse cutting or fancy figures with equal ease and precision.

The Disaton D-23 Electric Handsaw cuts every common home workshop material. It cuts wood, plywood, plantics, rubber tile, linoleum tile, asphalt tile, laminated paper and cloth, nylon and Plexiglass. It cuts k" steel plate, k" aluminum plate, angle iron, copper, bronze and brass. It cuts pipe, tubing and sheets.

Features unmetched by other saws have been engineered into the Disson D-23 Electric Handsaw to make it the world's finest—as well as the world's most usable power eaw. First, it gives you more cutting power than any other saw because it has the highest output horsepower. A 3-amp motor drives it at 3800 strokes per minute, Second, it cuts faster than any other saw because of remarkable ORBITE

action. The blade slices through material on the upstroke, but backs away on the downstroke. This also reduces fraying, need for sanding, and blade wear Third, the new Dission D-23 Electric Handsaw cuts more accurately and lasts longer. It is the only reciprocating saw with all needle and ball bearings—9 needle and 3 ball bearings. Check these features against any saw now on the market.

Your most economical buy in power saws. Think of the 1,000-odd uses you have—right now—for this power-packed lightweight! In home repairs and improvements you'll be able to make. In do-it-your-self projects. Think of the times you've wished for just one additional saw for a particular job at hand. Think of the times you've said to yourself that one day you'll have all the saws you need. You can have them all right now in this built-to-last, most usable power saw ever made. With four blades, rip fence and 10-foot detachable cord, the revolutionary Duston D-23 Electric Handsaw sells for just \$98.50.

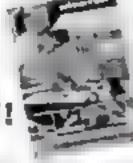
FREE! "Must" reading for every man interested in fine tools—Dieston Workshop Manual No. 1. Read it before you buy any saw!

H. K. PORTER COMPANY, INC.

DISSTON DIVISION

414 Tacony, Philadelphia 35, Pa.

FREE!
MAIL THIS
COUPON TODAY!



Gentlemen: Please send me a free copy of your Dieston Workshop Manual No. 1, describing the remarkable Dieston D-23 Electric Handsaw, I realize there is no obligation on my part.

Name-			_
Address			
City	Zone	State	

New Kodak 300 Projector

yet shows your slides bigger,

Here's a color-slide projector so lightweight you can carry it like a portable radio...so compact, you can store it on a bookshelf. Best of all, it lets you enjoy thrilling bigsereen projection even in a small room. At a distance of 10 feet, for example, your favorite 35mm color slide will fill a 40-inchwide screen.

You really have to see and handle the new Kodak 300 Projector to appreciate its remarkable versatility. Try the focusing and elevating mechanism... the smooth glide of the new Kodak Readymatic Slide Changer. And when you project your

favorite color slide, notice that the rocksteady picture you get is brilliantly illuminated clear to the corners!

Your Kodak dealer will be glad to show you the new lamp-condenser system and superb 4-inch, f/3.5 lens that produce these superior screen results. Ask him, too, about the Kodak 300 Projector's ultraquiet cooling system . . . built-in cord storage space. Complete with self-cover.

Kodak 300 Projector with Readymatic Slide Changer (holds up to 36 slides in cardboard mounts), \$64.50... or as little as \$6.45 down.

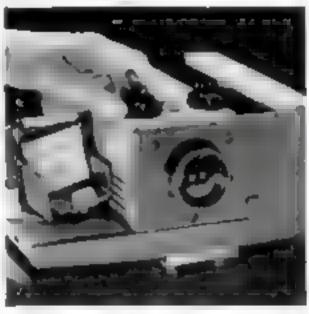
Kodak 300 Projector with 36-slide selfstoring Magazine Changer, \$74.50... as little as \$7.45 down.

Prices are list, include Federal Tax, and are subject to change without notice.

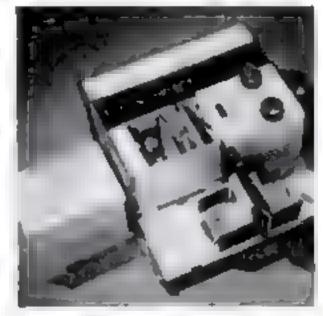
The only projector with the completely new



SO LIGHT, SO COMPACT, so easy to carry! Has self-cover, measures only 5 x 11 inches square, weighs only 9 pounds.



FOCUSING AND ELEVATION adjustments are fast.. precise . . . with all essential control knobs at your finger tips.



QUICK, E-A-S-Y ACCESS to the lamp and condenser compartment—storage space for your lamp cord is built right in.

EASTMAN KODAK COMPANY,

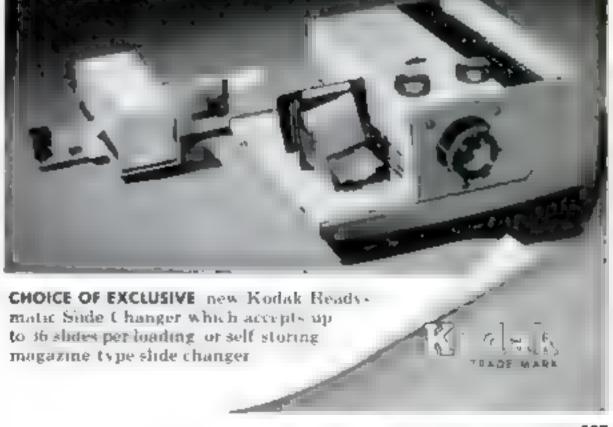


Kodak READYMATIC SLIDE CHANGER



PROJECTS 35MM, BANTAM, or the new, big 1½ x 1½ slides. Also (with an adaptor) single frames of your stereo slides.

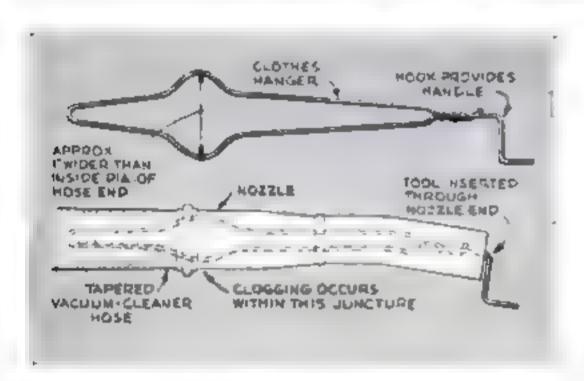
Rochester 4, N.Y.





Easy-to-Mount Mirror Backing Makes Handsome Frame

DECORATIVE, prefinished hardboard can make any mirror as pretty as a picture. For this round one, the outline was traced on the back of black-and-gold marble Marlite. Then, with the finished side up, an outsize circle was cut with a finetooth handsaw, and bolt holes drilled for brackets and hanger clips.



Bent Wire Hanger Cleans Vacuum Hose

When a tapered vacuumcleaner hose clogs, the trouble spot is usually where hose and nozzle join. A wire coat hanger, bent as shown, will clear it. Push the tool into the nozzle until the loop-spring is forced against the walls of the juncture. A few turns of the handle will then loosen the debris that is causing the jam.—Bruce D. Stewart, Winder, Ga.

COMING MOON:

Two Bonus Booklets on House Painting

In March PS: You'll want to read and save this bonus booklet: "Things to Do Before You Paint Your House." It's packed with tips on old-paint removal, calking and puttying, minor repairs, and estimating paint quantities It gives you a time-saving shopping list, and sound advice for choosing the right paints, brushes and rollers.

In April PS: When you're ready to take brush in hand, a second booklet, "The Know How You Need When You Paint Your House," will see you through the actual job of brushing new beauty onto your home. It tells you every trick of the trade, from the right sequence to follow when you paint window sash to cleaning brushes the easy way.

5

EASY STEPS TO

UNLIMITED ELECTRICAL OUTLETS



Electrostrip

Have all the electrical outlets you need with Electrostrip. Now in a new "do-it-yourself" kit, this modern home electrical system lets you twist in outlets any place along the strip . . . plug in lamps, appliances, TV exactly where you want them. Enjoy the extra convenience Electrostrip brings to every room in your home . . , install it yourself.

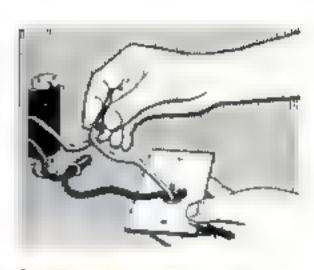
Electrostrip attaches to existing outlets quickly and easily. It mounts on walls, moldings, anywhere . . . can be painted to match any color scheme. And it's listed by Underwriters' Laboratories. Get Electrostrip from your hardware or building

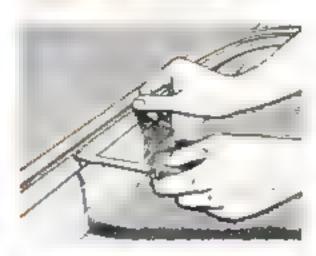
supply store. BullDog Electric Products Co., Box 177, Detroit 32, Michigan. In Canada. Toronto 15.

Look for the colorful kit: 15 feet of strip, 4 outlets and fittings with detailed and easy-to-follow installation instructions —all for only \$9.95. You'll enjoy full HOUSEPOWER with Electrostrip.

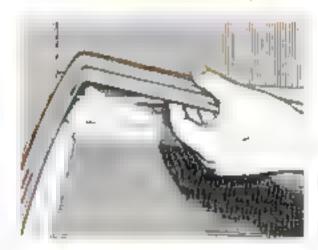


Made by Bull Dog Electric Products Co., a division of I-T-E Circuit Breaker Co.

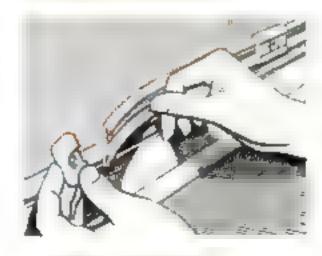




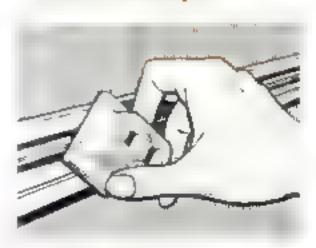
2 Mount Electrostrip



3 Bend at corners



Afflix end caps



5 Twist in outlets

Remodeling?



Building Furniture?



Sharpening Tools?



makes the file you need

Available at hardware and building supply dealers.

FREE TO HOME CRAFTSMEN: "File Filosophy." Big new edition; dozens of illustrations show you how to use and care for your files. Send for your free copy soon



NICHOLSON FILE COMPANY





(In Carada, Richelan File Company of Canada Ltd., Part Hope, Untarie)

NICHOLSON FILES A FILE FOR EVERY PURPOSE

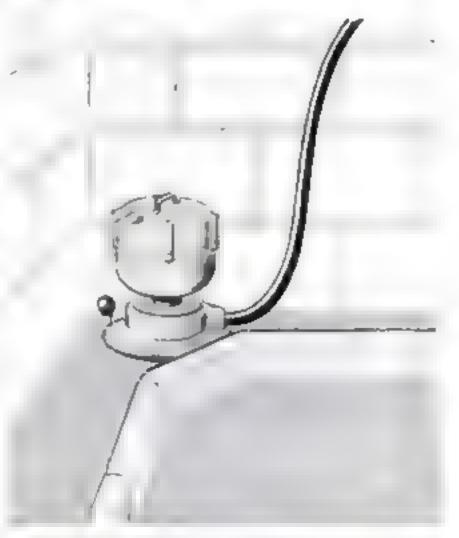
230 POPULAR SCIENCE

Old Battery Cable Supplies Copper Wire

Salvage an old battery cable and you have a good source of copper wire. Cut away the battery-terminal end, strip off the insulation and hang the cable so it will be handy in the shop. Strands can be separated from the cable, unwound and cut to length as needed for lacing or wrapping jobs.—R. V. Thompson, Clinton, lowe.

Screw caps on bottles and cans containing liquids that evaporate readily should be airtight. If the cardboard seal in the cap is lost or damaged, cut a new one from heavy automotive gashet paper.—

Ralph Thomas, Cedar Rapids.

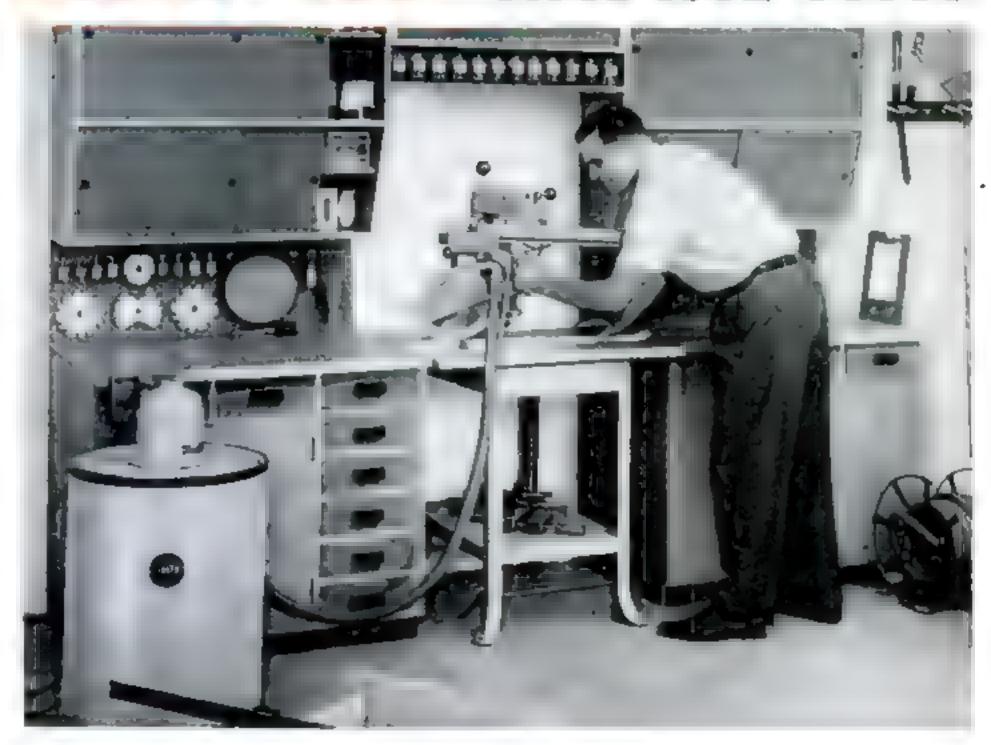


Brick Dike Channels Seepage

ALTHOUGH I have a sump pump in my cellar, a flat cement floor kept rain and anow seepage from draining off. To remedy the lack of grading, I built a dike that channels wall drippings to the pump. A single row of bricks, it is set back about 4" from the base of the walls. I used asbestos-fiber roof cement to make a water-proof mortar and, after it set, coated the brick with decorative floor enamel.—Andrew B. Newman, North Hills, Pa.

ROCKWELL-BUILT

DELTA "900" RADIAL SAW



most powerful radial saw built for home workshops

Rugged as it is good looking, the New Advanced Design "900" Radial Saw is powered by a full % hp motor. And it's so versatile that actually it's a complete, all-purpose workshop! You can rip, cross-cut, drill, sand, shape and do many other jobs fast and accurately. Also shown above is the New Advanced Design Delta Dust Collector. Use it with any power tool to keep your shop free of sawdust—even to spray paint. It's powerful enough to pick up a 1" steel ball.

IT'S SO EASY TO OWN THE BEST!

Because Delta makes the world's most complete line of combination, all-purpose and individual power tools, you can choose tools exactly right for you. And you'll have the "newest look" in the world's finest power tools.

BUILD THIS ALL-PURPOSE SHOP

Delta experts designed the compact workshop shown above so that you can build it in your

garage or besement. Easy-to-follow plans and the New Delta Reference Guide are yours—for just 10 send your remittance with your name and address to Rockwell Manufacturing Co., Delta Power Tool Division, 504B N. Lexington Ave., Pittsburgh 8, Pa.

Do it now — then see all the New Advanced Design Delta Tools at your Delta Dealer, (He's listed under "TOOLS" in the Yellow Pages.) Or at leading Department, Hardware, and Building Supply Stores.



?? SHOP QUIZ??

Question 1_

What's the **EASIEST** way to drive wood screws?

Question 2.

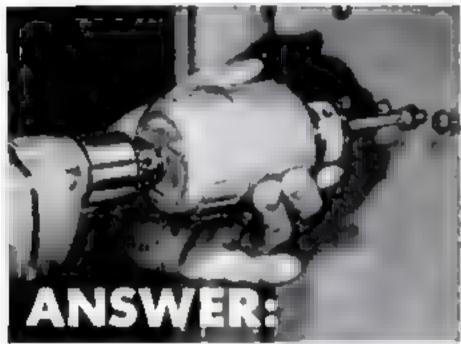
What's the **EASIEST** way to remove wood screws?

Question 3

What's the **EASIEST** way to run nuts or bolts on or off?

Question 4

What's the **EASIEST** way to use heavy-duty cutting tools like hole saws, masonry and auger bits?



WITH YOUR ELECTRIC DRILL AND A

Supreme Versamatic

Reversible speed reduction attachment that fits every power drill. Increases power 7 times. Reverses with one simple twist. A must for every drill owner.

\$ 495

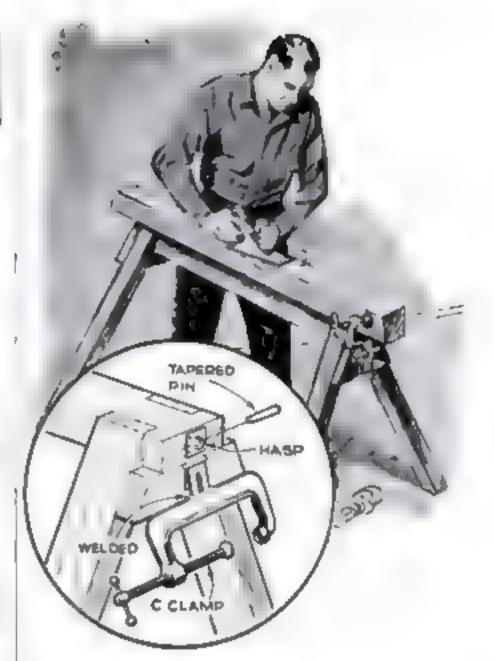
TOOL COUNTERS

By the makers of SUPREME BRAND CHUCKS

SUPREME PRODUCTS CORPORATION

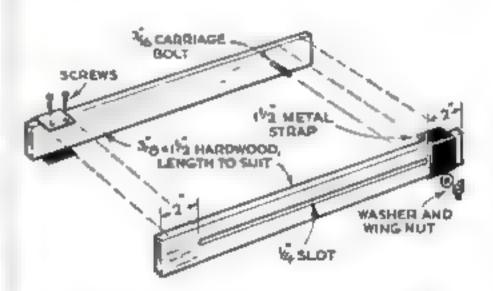
2222 S. Calumet, Chicago 16, Illinois

A Division of A-S-R Products Corporation



C Clamp Is Sawhorse Vise

A C CLAMP fastened on the end of a sawhorse makes a neat device to hold lumber for dressing. The clamp is welded to a hasp which is then screwed on the horse, as shown in inset. A tapered hardwood pin holds the clamp in locking position.—Victor H. Lamoy, Upper Jay, N. Y.



How to Make an Extension Rule

Thus sliding stick for inside measurements is made from two strips of scrap hardwood. Put a bolt through near the end of one and slot the other; then fasten the two together with strap metal, as shown in the drawing. Use a cardboard shim to provide some sliding clearance.

—S. F. Franklin, Port Stanley, Ontario.

PROVED AND APPROVED

"Around the World" WITH FORD



Sealed Power

STAINLESS STEEL OIL RING

FEBRUARY 1958 233

GET YOUR COPY



A new, revised and expanded edition of a practical booklet that amateur and professional mechanics and industrial arts teachers by the tens of thousands have used and endorsed. Illustrates scores of ways for doing it better and easier with thirty different hand tools. Tips on proper care and maintenance of tools along with other useful information for the mechanic and hobbyist. The coupon will bring your copy by return mail.

SEND A DIME OR GET YOUR COPY ANY CRESCENT TOOL.

Ask Your Hardware Dealer.



To Crescent	Tool C	o., Jun	estows	, N. Y	Y.	
	Enclo	sed fin	d 10# fc	or my	copy of	
41	HOW	TO U	SEHA	IND	TOOLS	

Name		4 have 4 max 4 m	
**********	************		

Inside Russia by Car [Continued from page 184]

rozhe we were stopped decisively by a militiaman. As we waited, the first of a strange procession appeared—two men carrying red flags, then two others carrying medals on red-velvet panels, Next came women bearing vast floral pieces, followed by perhaps 200 men, women and children and a small brass section playing stirring yet melancholy music. The slow procession trudged solemnly up a slope. Finally came a wooden casket,

carried by several bearers.

Russian drivers are different. They are less competitive than we are, except in Moscow's heavy traffic. They are also notably helpful; if you run out of gas, you put an empty jerry can on the car roof-it will stop the first truck that goes by. And they seem rather fatalistic about breakdowns. Russian trucks get run to death before they rate an overhaul, so that many an off-the-cuff repair has to be made on the road. Russian mechanics impressed me. We had a difficult welding job done in Moscow; it turned out excellently. We also had a tubeless tire repaired there. The mechanic (who had never seen one before) not only fixed it, but achieved an airtight seal when he remounted it—he checked it in water to make sure.

To escape Zeleny Gai (O'Connor's Last Resort) on the trip back, we drove to Zaporozhe instead. It was here, on a Sunday night, that two teen-age machinist apprentices came up to us on the street and told us elatedly of Sputnik I. Later on, after our return to Moscow, we were approached by four students who had spotted us as foreigners and wanted to talk, I produced a copy of POPULAR Science with color photos of 1958 U.S. cars. Though calmly proud of Sputnik, the youngsters were frankly envious. "We won't have cars like that for two years," said one student. "Two?" scoffed another. "Ten would be nearer."

Because we had overstayed our visas, there were hints that we might have some trouble leaving the country. It didn't develop. We were courteously cleared at the Bug River bridge, and bade our guide and friend of three weeks goodbye. There was no inspection. We were allowed to take out all our film, to develop our impressions of Russia back home.

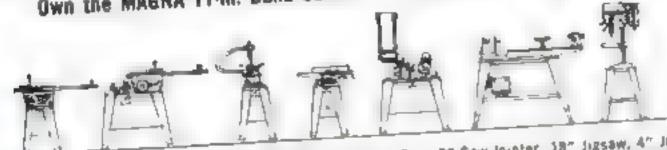


Why Magna?

-Because MAGNA's new, complete family of superior power tools incorporates the first significant design contributions in over a quarter-century!

HERE'S II HY THE MAGNA 11-IN BAND SAW gives you more than any other band saw: • New Ease of Operation with exclusive Automatic Binde Tracking (quick, safe blade changing) Single-knob for one hand adjustment of blade guide height! • Increased Capacity — blade offsets to cut any length stock, up to 6° thick! • Integral Precision — exclusive — blade offsets to cut any length stock, up to 6° thick! • Integral Precision — exclusive — Cross Slot table for precision re-sawing! • Rugged Durability — one-piece pressure cast Cross Slot table for precision re-sawing! • Rugged Durability — one-piece pressure cast frame! Basic Band Saw only \$79.95, delivered! Mail coupon today for full specifications in free Magna-Line catalog

Own the MAGNA 11-in, Band Saw for as little as \$1.54 a week!



MAGNA-LINE tools for home and industry include (I to r) 9" Saw, 9" Saw-Jointer 18" ligsaw, 4" Jointer 6" Belt Sander, Compressor Sprayer, 30" Lathe, 12½" Orill Press (Also the new MAGNA Thritty-Three 8" T & Saw, 12½" ligsaw, 4" Belt Sander).



World's largest independent producers of power tools

Dept. 703-S . !	t TOOL CORPORATION Menio Park, California OR Most 2808, Fort Wayne, Indiana Me your free, illustrated MAGNA-LINE catalog
Name	
Address	Zone_State

BY M REG

Be sure it's a <u>genuine</u> CHANNELLOCK



Why? Only Channellock has undercut, interlocking channels that can't slip no matter how tight you grip. Only Channellock has the reinforced tension edge to withstand maximum gripping force. These exclusive features have made the Channellock No. 420 the first choice of skilled mechanics everywhere. So be sure you get only genuine Channellock pliers. Look for the trademark on the handle

ASM YOUR TOOL SUPPLIER FOR CHANNEL BUR PLERS - BY MAYE



CHAMPION DEARMENT TOOL COMPANY

What Science Knows About Headaches

(Consumand from page 140)

itself, but acts by controlling painfully distended arteries.

This substance is extracted from ergot, a parasitic fungus that attacks rye and other cereal plants. For more than a thousand years, ergot has fascinated scientists. During the Middle Ages, ergot-infested rye flour was responsible for a strange poisoning, sometimes called St. Anthony's Fire, which periodically broke out in epidemic form and caused the death of tens of thousands of victims. Some of these unfortunates suffered from frightening convulsions. Others suffered from equally terrifying hallucinations.

In recent years, chemists have separated from ergot an array of different compounds. Some produce convulsions. Others induce hallucinations. One compound, ergonovine, stimulates the contraction of particular muscles, and is used now by many obstetricians.

For migraine victims, the most important ergot chemical is ergotamine. It and a synthetic derivative, dihydroergotamine, are now used for the control of migraine. They are reportedly effective in 80 to 90 percent of cases.

"No other headache remedy of any type," says one authority, "has yet been found to provide such widespread relief."

Drugs are not enough. Although the drugs can stop the pain of migraine in most patients, and ergotamine—usually in combination with caffeine—can often ward off an impending attack, they cannot cure the disease and prevent the painful bouts altogether. This requires some drastic psychological adjustment. For such an overhaul of emotions and outlook, one distinguished psychiatrist; Dr. Spurgeon English of Temple University, has offered this advice:

"This is not a perfect world, Families and friends have many foibles. Perfection is rarely attained, so be satisfied with less.

You cannot please everybody, so stop trying ... Be efficient, but not to the extent that perfection becomes a burden ... Speak up if you want to ... Approve of yourself ... And stop feeling so guilty. We are all human beings and we all make errors ... Give a little and you will get a lot—maybe even a reduction of that pain in your head."

"Sweetest Music This Side of Heaven"



Guy Lombardo drives MERCURY'S New Mark 78

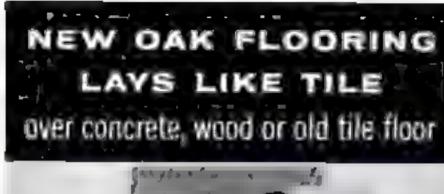
"'Sweetest Music This Side of Heaven' has long been associated with my Royal Canadians, but after driving the new Mark 78, I'd say Mercury could claim it for outboards — on every score."

The secret of the sweet, smooth music of this 70 horsepower engine is in its exclusive six-in-line design, proved by experience to be far superior to any other for high horsepower outboards.

Here is the world's supreme expression of outboard dependability and safety. It's the powerful answer to the public's request for better power for bigger, safer, more comfortable boats. The Mark 78 has more exciting new features than ever offered on any outboard — plus the famous compact Mercury look and colorful styling.

Mercury offers the most that's new for '58 — more all new engines, more models, more safety features. See your Mercury dealer soon or write for FREE catalog.







Bruce Laminated Oak Block

Modernize your home by installing this beautiful hardwood floor over your old floors. Or use low-cost Bruce Laminated Blocks to create new living space in attic, basement or addition.

Easy to lay - Just apply adhesive (Bruce Everbond Coldstik) and lay blocks, Tongues and grooves assure tight fit. No nailing . . . and no sanding or finishing either, because Bruce Laminuted Blocks are completely prefinished at the factory. Your new floor is ready to be used and admired as soon as you lay it.

Moisture-resistant — Blocks are 9" square and only h" thick. The three oak plies are laminated under heat and pressure with waterproof glue to prevent expansion and contraction. Ask your lumber dealer for a cost estimate. Mail coupon for color literature on Bruce Lammated Blocks.

SEND FOR COLOR FOLDER



E. L. Bruce Co. Box 397-r, Memphis 1, Tenn.

Send complete information on Bruce Lammated Oak Block Floors.

Name

Address

Bruce LAMINATED Oak Block Floors

By the world's largest hardwood flooring maker

l Fiew 1,900 M.P.H. [Continued from page 163]

off, there had not been an appreciable lessening of my momentum, as deceleration in the rarefied air was a slow decay. It was several minutes later and altitude was below 50,000 feet before the X-2 was

subsonic again.

At 30,000 feet now, I did more maneuvers, approaching stall and then pulling up to test dive recovery, but my mind wasn't really on my work. Instead my head was filled with thoughts of the speed I had just attained, faster than any man had ever flown. I felt that I had made a contribution to mankind, a small step forward in aeronautical science—perhaps another step toward the time when men will fly in space.

Although I could not disclose my true speed over the radio for security reasons, I left no doubt that my flight had been a successful one. Congratulatory messages filled my headset, and when my chase pilots picked me up I did a few exuberant

victory rolls.

At 20,000 feet we entered the overcast, breaking clear again at 16,000, where below me to the east lay the familiar runways of the dry lake. Waiting down there —as they always had—to see me safely home again, were the wonderful people who had made this flight possible. Also waiting for me, still unseen but felt more keenly than ever, was Avis and home. And I was free now to go on to my new assignment at the Armed Forces Staff College at Norfolk, Va.

Making my last landing at Edwards Air Force Base, I came in lower over the key point, chase planes with me and Maj. Childs talking me in. On the ground now, I touched down in a cloud of dust and skidded to a smooth stop, just 15 minutes after the drop from the B-50 a life ago. . .

Cindy and Vicky were at school when I got home, but five-year-old Kendall was in the yard digging. Avia ran out to the driveway as I jumped from the car, and hugged and kissed me. Her eyes were

shining with joy and relief.

Over the luncheon table I still talked about the flight that morning, and she tried to appear interested. But I knew her heart wasn't in it, and after a while I began talking about other things. Besides, the movers were coming tomorrow, and I had to help her do the packing. END



The Porter-Cable Router is one of the most useful woodworking tools you can own. With it you can do all these jobs: make decorative edges on table tops, bookcases and shelving; cut outlines for inlay jobs; grooves and rabbets for cabinet work; mortises for door hinges; circles and ovals-all with perfectly smooth edges and much more.

Illustrated here is the famous Porter-Cable

Router #100, now with full 1/2 h.p. It is quality built with a non-marking base, precision ball bearings and high-speed, interchangeable motor for Power Plane and Shaper. An outstanding value at only \$57.50. Model #162 1/2 h.p. Router, \$49.50.

See these new professional quality tools at your Porter-Cable dealer today or write for full information.



ROUTER BIT KIT

Contains everything you'll need for hundreds of basic Router applications and jobs. Three high-speed bits and sharpening wheel come in hinged transparent case.

No. PR-138Y Bit kit. . . only \$9.95.

PORTER-CABLE MACHINE CO.

8152 Morcellus Street Syrocuse 4, New York Saws, Drills, Sanders, Routers, Shapers, Planes.



In Canada, write Porter-Cable Ltd., Box 5019, London, Ont. Canadian Prices Slightly Higher

How We May Get H-Power [Continued from page 168]

and that nixed the setup as a possibility for fusion power. If hot gas touched the wall, during a fusion reaction in a fullscale furnace, the tube would go right up in smoke.

So things stood, several years ago, in magnetic-bottle trials here and abroad.

What's happened since then?

Although much is still under wraps, there are hints as revealing as this:

"Some of the instabilities which did worry us considerably a year ago are now very well in hand," Congressmen were told in mid-'57 by the AEC's director of research, Dr. T. H. Johnson.

And the most impressive evidence of fusion-power progress is the beginning

of big-scale experiments.

Currently the headlines are coming from England, where a doughnut-shaped thermonuclear machine named Zeta has already been in operation for several months. While its dimensions are undisclosed, there are indications that it's a sizable affair. The British experiment-

ers report having attained temperatures of several million degrees—and believe they observed signs of a momentary fusion reaction. At this writing they were trying to confirm it. Such "flashes in the pan," which could occur at a lower temperature than a self-sustaining fusion reaction requires, would consume more power than they yielded; but they would be of great interest as an important step along the way.

In this country, a giant experimental thermonuclear machine, the Model C Stellarator, is scheduled for completion within three years at Princeton, N. J. Its shape and size are secret, but it will be so large that a special building will be required to house it, and an overall size of 100 feet is one unofficial guess. The AEC says it will consist essentially of a tube containing ionized gas, and external coils whose magnetic field will confine the gas, for attempts to heat it to "millions" of degrees and produce a fusion reaction. Auxiliary equipment will include a "huge" generator, power





TORSION-AIRE

• WHAT IT IS • WHAT IT DOES • WHY IT IS BEST FOR YOU

Last year Chrysler Corporation proved that America was ready for something new in the way of ride and handling. And Torsion-Aire has given people just what they wanted!

Torsion-Aire is Chrysler Corporation's name for its rubber-isolated, ball-joint, anti-dip, torsion bar system of suspension. And it's unique among American cars. Its design comes from a fresh start, a clean drawing board. It is based on the belief that piecemeal modifications—and design compromises to accommodate optional suspension elements—are no match for a fully integrated, balanced system designed as a whole, with the whole car in mind.

As a result, it's the most advanced suspension system yet developed. No other gives you all these important advantages:

 Torsion-Aire is built right into the car. It's not "added on" or "extra". The Torsion-Aire system of suspension was designed for the car . . . and the car was designed for it.

- Torsion-Aire is a complete system. It is designed "in depth" to eliminate your three biggest handling problems. No more starting squat. No more sway on turns. No more braking nose-dive.
- Torsion-Aire is standard equipment on all Chrysler Corporation Cars—and at no extra cost. Suspension isn't an accessory you can take or do without. It's as basic to the car as wheels.
- Torsion-Aire is a proven system. Unlike untried systems, Torsion-Aire has been proved by billions of passenger car miles—by more than a million satisfied owners.

Want more proof of Torsion-Aire superiority? Take the Torsion-Aire road test. You don't have to seek out special conditions. With a bump in almost any block—and a corner at the end of it—you can prove this new kind of ride to yourself in the first quarter mile!

CHRYSLER CORPORATION THE FORWARD LOOK
PLYMOUTH . DODGE . DE SOTO . CHRYSLER . IMPERIAL

THEY

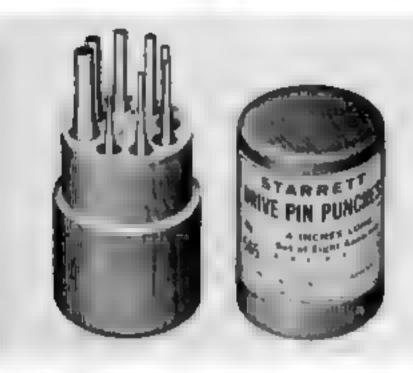
GO

Indispensable to mechanics, machinists, service men, craftsmen . . . these Starrett tools belong in every kit.

TOGETHER

Starrett

DRIVE PIN PUNCHES



For driving cotter pins, drift pins or bolts
— also for lining up bolt holes. Made of
specially selected tool steel hardened and
polished with chamfered heads and
knurled grips. Set of eight from 1/15" to
1/15" in round wood box or red plastic case.

3" BENCH BLOCK

No. 129



Handy for driving pins, drilling, heading — also makes an excellent light anvil. Forged, hardened and ground with a smooth finish to protect work and knurled side grip for easy handling. Nine holes range from 1/4" to 5/4".

BIG	N	EW	CATA	LO	G—	FR	EE
Describ				_			

3000 Starrelt Tools, Send the coupon.

STARRETT TOOLS are carried by Instituters and Hurdware Tool Steros.

THE	L.	5.	STARRET	IT CO	MP	ANY
Depl	Ļ.	PS,	Athol,	Moss	., U.	S. A.

Flease send my free copy of the big new Starrett Catalog No. 27.

Name		-	,	-	•	B-	-	-	•	ŧ	*	'n	ń	ı	-	•	-	-	-	•	÷	в-	-	•	-	-	
Occupation.																											

Address	 	

Zone...State.

How We May Get H-Power

condensers, electronic gear, and vacuum apparatus.

Apparently, with this machine, U. S. scientists hope to bring off the first sustained controlled-fusion reaction.

That would be a feat as memorable as was the achievement in 1942 of the first self-sustaining chain reaction in an atomic pile.

Suppose they do get a controlled-fusion reaction. How would they hitch it up to make wheels go 'round?

You could use the heat to make steam and run a turbogenerator, just as they do now with a fission reactor. It would be grossly inefficient, though, to apply an astronomical temperature just to heat steam a few hundred degrees.

Is there a better way?

The dream is to turn the heat of fusion directly into electricity, in such a way as this:

First the plasma is compressed by a magnetic coil. Then, as fusion takes place, heat expands the plasma and drives it outward again. That induces a current, in the windings, which you can draw off for power. Keep repeating the cycle, and you get a steady flow of electricity from fusion. You could compare it to a gasoline or diesel engine, in which the piston compresses the fuel, and then the ignited fuel expands and drives the piston.

Will a fusion-power plant be dangerous? Could it blow up like an H-bomb?

No, because only a tiny amount of deuterium will be in the furnace at any time—just enough to supply the wanted power, and much too little to make a bomb, or stoke a dangerous runaway reaction.

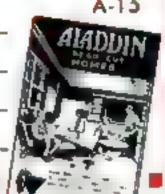
And unlike a fission-power reactor, a fusion furnace would store up no large accumulation of dangerously radioactive fission products, whose accidental escape could imperil a countryside. The only radioactivity of a fusion plant would consist of the extremely short-lived neutrons, and any moderate radioactivity that they imparted to nearby materials.

So it looks as if a fusion reactor should be the safest kind of all.

242 POPULAR SCIENCE

car with the money this coupon can save you!

Send 25¢ today for 72-page catalog in color THE ALADDIN CO. BAY CITY, MICH. STREET_____



ALADDIN READI-CUT HOMES

ARE ENGINEERED TO SAVE YOU THOUSANDS OF DOLLARS!

LOOK AT THE FACTS: Aladdin sells thousands of houses, Because of the huge quantity of lumber used the average builder cannot match Aladdin's prices. And you save on labor, Instead of paying



Noted for HIGHEST QUALITY and BEST CONSTRUCTION



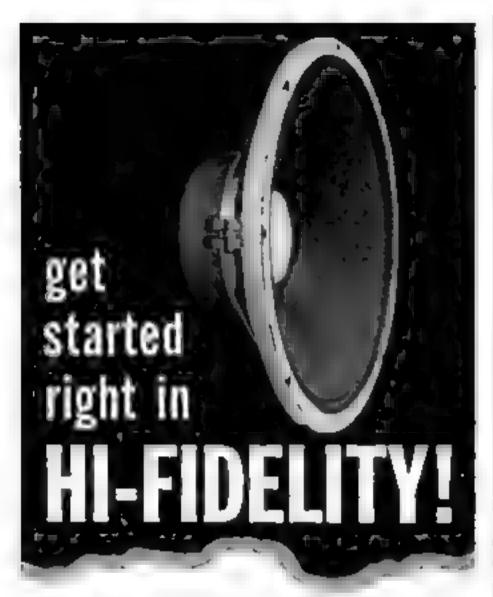
At DELIVERED PRICES that will SAVE YOU MONEY



corpenters \$20 a day or more you can easlly build, or help build, an Aladdin home yourself. Thousands have done it. Please keep one thing in mind: When you build an Aladdin Home you get the finest quality fumber and materials - shipped to you Freight Pard. There's a wide choice of modern designs by Aladdin's architects and your finished Aladdin Home will stand comparison with homes priced far above what you pay. That's why thousands of families who must save are buying Aladdin Homes today. One thing more: Aladdin Homes are in all 48 States — you can see one near you before you buy. But first send the coupon above for Aladdin's new 1958 Catalog. It will open your eyes to savings you never thought possible! Moil it today!

5 to 8 Rooms - RANCH, COLONIAL, CAPE COD, 2-STORY NOT PREFABRICATED . ALL MATERIALS READI-CUT

FEBRUARY 1958 243



Start with a JBL D130—your basic loudspeaker. In no other high fidelity component is precision more important. The D130 is an unquestioned masterpiace of precision, without equal in advanced engineering, meticulous craftsmanship, and accurate reproduction. The JBL D130 is the only 15" extended range loudspeaker made with a 4" voice coil. When the D130 is used alone, this makes for crisp, clean bass; smooth, extended highs. Later, when you advance to the ultimate excellence of a JBL two-way system, add a JBL high frequency unit and dividing network. Then your JBL D130 will serve as a perfectly matched, beautifully balanced low frequency driver.



Biggest Boom in Music [Continued from page 159]

wind chest and the pipes that it feeds. The levers are controlled by keys, and when an organist presses one, air rushes through the selected pipe. The pitch of the resulting sound is governed by the length of the air column, while the quality or character of the voice is largely determined by the formation of the pipe end. One type—similar to a penny whistle—has a sharp metal lip that partly blocks the passage and sets the air column into vibration. The sound it produces is quite different from that generated by a vibrat-

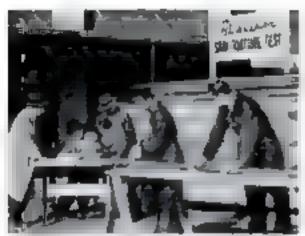
ing reed in the oboe-like pipe.

This wind-and-whistle principle has been found capable of producing four different families of voices. The distinctive organ sound of air sighing through pipes is known as diapason; interposing a vibrating valve between pipe and air supply adds a tremulous quality. The three other classes of organ voices are called reed, flute and string for the obvious reason that they are imitative of these instruments. Within each family, however, there are almost endless variations—just as there are real flutes of different lengths and string instruments as unlike each other as the harp and the banjo.

As the organ builder's art progressed over the centuries, separate organs were frequently combined into single instruments by the addition of extra ranks of pipes. To bring them under the control of one player, extra keyboards, or "manuals," had to be added to the console. Church organs of recent times have rarely had fewer than three manuals plus a pedal keyboard. When "couplers" were added, any rank of pipes could be played from any keyboard, and several voices could be played simultaneously for ensemble effect.

Because of their great size, complexity and cost, pipe organs were limited for centuries to churches and palaces. Their pipes, accordingly, were fashioned to produce tones of solemn dignity

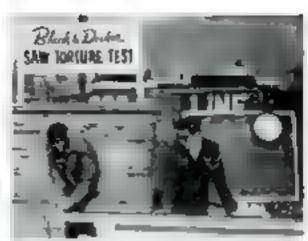
Now, since most pipe-organ voices are only imitations, it follows that there must be other ways—possibly better—to produce these sounds. Among the more practical means is the reed-organ principle in which compressed air is used to vibrate thin blades or reeds. Each key of a reed-organ manual controls a valve. Pressing



10:05 A.M. The test begins. The B&D Saw will be tested on 2" lumber, making a variety of cuts.



4:00 A.M. It's 18 hours since the test began. Over 4000 ft. of lumber cut so far.



8:30 A.M. Over 22 hours and a third crew of men is on. 13 blades have been used.

7-DAY SAW TORTURE TEST PROVES BLACK & DECKER TOO TOUGH TO BEAT!

Hour after hour, day and night—for one week, a Black & Decker Saw was tested continuously by the United States Testing Company, Inc., Hoboken, N. J. This saw received more wear and tear than most saws ever get in a lifetime of use.

And the saw stood up! After seven grueling days and nights, every part of the saw was found to be in perfect condition. Here is proof of Black & Decker quality...why we say Black & Decker Saws are tough enough for any job! The BLACK & DECKER MFG. Co., Dept. \$028, Towson 4, Md.



Test runs through the night. After 24 hours, saw was still going strong. It was then put on laboratory testing machine to continue test! for 6 more days and nights.



Biggest Boom in Music

a key allows inrushing air to flutter the

appropriate reed.

Like church organs, most reeds of the last century were built with reverent voices, and the two types shared still another characteristic: They had an appreciable time lag between the pressing of a key and the sounding of a tone. Added to the religious associations of the instrument, this slow response tended to limit organists to the performance of sacred—or at least stately—music.

Thus while the modern organ can trace its lineage back to ancient pipes and reeds, its marriage to popular music took place only a generation ago. Many observers believe that it was the nickelodeon that brought them together. In the days when dialogue was printed on the screen, it was considered necessary to supply musical sound effects and accompaniment. Thus larger theaters turned to organs.

"Mighty Wurlitzers" (named for their innovator and principal maker) filled picture palaces with sound. The organs were specially built to give fast key response and highly theatrical effects. The

Wurlitzers' showiness came, literally, from pulling out every stop. Extra degrees of vibrato were added, and new pipes created to simulate such unchurchly instruments as the saxophone and trombone. A variety of instruments that couldn't be imitated (such as snare drums, xylophones, and marimbas) were actually built into theater lofts and connected to the organ consoles.

The enormous bounce and musical variety of these theater models added new dimensions to organ music and created a wide and enthusiastic following. They have also influenced the selection of voices and special effects built into most elec-

tronic organs.

Whether it's because of these new sounds, or their more traditional voices, modern organs are clearly riding a boom. The fact that most people (97 percent according to one survey) find organ music pleasant is expected to help. So is the snowballing effect that comes from increased exposure on radio, television, hi-fi recordings and in the home.

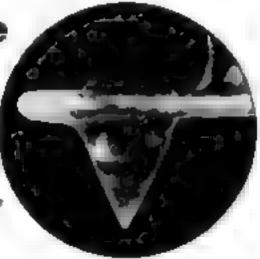
Convinced that the trend is leading



The difference can ruin your records!

Enlargement of "bargain stylus. Unretauched photo)

Enlargement of genuine G-E diamond stylus. (Unretouched photo)



INSIST ON A GENUINE GENERAL ELECTRIC REPLACEMENT STYLUS

A G-E replacement stylus is a precisionengineered assembly, designed and built by the same people who developed the famous General Electric cartridges. The diamond tips are painstakingly ground. Specially formulated damping blocks do not "fatigue" with age, Positioning of these blocks has been precisely calculated

to bring you the smoothest possible frequency response.

General Electric replacement styli are manufactured only by G.E. for G.E cartridges. Don't take a chance' Insist on a factory-scaled box clearly marked with the G.E. monogram. Sold by leading dealers. Mail coupon for free booklet.



P5258

All G-E styll come to you in factory-sealed boxes clearly marked with the General Electric managram.



General Electric Company Specialty Electronic Components Dept. Section HF, West Genesee Street Auburn, N. Y.

Please send me your free illustrated booklet on genuine G-E styli and contridges.

Name

Address

Zone State

GENERAL 🚳 ELECTRI





In engine reconditioning

FEDERAL-MOGUL means FINE PERFORMANCE!

Any engine will perform better when reconditioning includes Federal-Mogul bearings. They are engineered for the job. If the crankshaft has to be turned down, there are Federal-Mogul bearings in the correct undersize to fit it. Federal-Mogul reborable bearings can be align bored. For heavy-duty jobs, Federal-Mogul sintered copper-alloys are the answer. That's why mechanics PRE-

FER Federal-Mogul bearings...they are designed to restore fine performance. Ask your mechanic!





Biggest Boom in Music

straight up, several manufacturers have expanded production and others have entered—or re-entered—the field. At least one firm offers a build-it-yourself kit of parts, others feature piano-organ combinations and organ attachments for piano keyboards.

One of the newest instruments to appear is based on a unique voicing system different from any of those mentioned above. Instead of generating organlike signals, the California-made Chamberlin uses tape recordings of individual notes taken from a wide variety of instruments. These realistic sounds play back when you press the appropriate keys. Other prerecorded tapes are provided for bass chords and special effects.

The swelling voice of electronic organs has been likened to the musical upsurge that put tens of thousands of reed organs—or harmoniums—into American parlors during the last half of the 19th century. But unlike the parlor harmonium—which filled an entertainment void in many isolated farmhouses—the electronic organ is successfully rivaling countless other diversions available in the home or a short car-hop away.

And there's another notable difference. The reed organ was commonly the focus around which the family would gather for hymn singing or just plain recreation. Though everybody joined the singing, there was usually just one who could play.

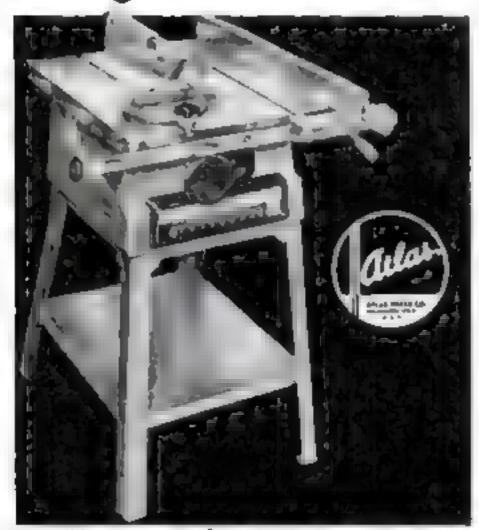
The electronic organ is a focus, too, but it is more often played by several members of the family. The ease of operation that has made this possible is undoubtedly the biggest factor in its sudden rise.

The love of music that most people have has been lavishly fed by radios, phonographs and a variety of other devices. The new organs, however, cater to what may well be a still more fundamental need—self-expression through musical creation. The playing of music has ceased to be a private and limited preserve.

Electronic organs, to be sure, offer many challenges to trained musicians. But their most enthusiastic fans are like the lady in Port Clinton, Ohio, who wrote to a manufacturer: "It has opened up a whole new world for the entire family. At present we are beginners, and can only play picture music, but it's wonderful and we love it."

Here's the most advanced saw line on the market today! with CHELEFINE I **EXCLUSIVE** "Micro-Guide" ILLERS FALLS Millers Falls ALL-NEW line of 747 **FULL-POWER SAWS** 71/4" Four all-new, deep-cut models, loaded with exclusive features and Millers Falls traditional high quality. You'll find here a saw for every job - and every budget; with more power per pound than any others on the market. Two heavy-duty models feature quick change integral depth and angle adjustments, safety window, exclusive Micro-Guide, and full 2 h.p. motors. Two new standard-duty saws have 65% power boost over previous models, with professional features and performance that make light work of 90% of all sawing jobs. All are rugged, lightweight, perfectly balanced - and at prices unmatched for this quality. See them at your dealers today! HEAVY DUTY STANDARD DUTY No. 800 - 81/4" only \$93.00 No. 747 - 71/4" only \$84.50 No. 727 - 7"..... only \$74.50 No. 626 - 61/2" only \$54.50 No. 626 61/2" MILLERS FALLS CO. - Dept. PS-23 / Greenfield, Mass. HAND AND POWER TOOLS MADE FOR HOME AND INDUSTRY

DOLLAR for DOLLAR *Citlas*. Gives you Greater Value!



10" TILT/ARBOR SAW The Basic Tool for Home Shops

With this precision Atlas tilt/arbor Circular Saw you can do almost every basic woodworking operation . . . faster, more accurately and with maximum safety. It rips and cross cuts lumber to size — cuts angles, bevels — and with attachments it dadoes, handles straight shaping operations — more accurately and efficiently than any other type of power saw.

Atlas 8" and 10" tilt/arbor saws have ground grey-iron tables, sealed-for-life ball bearings, patented quick-positioning double locking fence, grip-form mitre gauge, dual-control handwheel. The new structural box mechanism of the cradle and arm holds the blade in rigid alignment at every height, angle and cutting load (an Atlas exclusive... the most significant advancement in saw design in two decades). Unexcelled for general carpentry, these great new Atlas saws also give you the accuracy you need for fine cabinet work, built-

ins, trim and furniture projects. See them and compare before you buy any sew!



2-25 N. PITCHER ST., KALAMAZOO, MICHIGAN

The Robot That Runs a Railroad

[Continued from page 117]

of its closed positions to the other."
"Say a chunk of ballast works up between the points and the backing rail, so

the switches won't close?"

"That's CTC's second job. I've just told you how we use code signals to operate the switches and lights out here. But a second set of signals must go back to the control board to show that the field location has done its work. In the case of an open switch you're dealing with another transmission system called an 'audio frequency overlay.'"

"Come again?"

"Well, let's make it sound simpler than it is. At every block-signal location we send a tone signal through the rails. Now imagine a hi-fi-minded relay listening tight-lipped to this concert. When a switch isn't fully closed the tone signal goes sour and the hi-fi relay drops its jaw. That opens a circuit and the field location passes the word along to the dispatcher by refusing to give him a switch-position light on the machine. Then it's up to him to call the nearest maintainer."

Three streamliners and one redball freight later, we were back in the CTC office at Perry, watching relief dispatcher Bill Kelly plot his meets on the master

keyboard

"This CTC machine," he told us, "was actually built on the installment plan. The cabinet I use to handle trains for the first 60 miles out of Council Bluffs went into service first, at a station called Manilla. Then we put in the one at my right, for movements between Green Island and Marion Yard, near Cedar Rapids. When we closed the gap between them with the board in front of me, we had a problem—how to keep traffic rolling while we brought the small machines into Perry."

"That's when the signals-and-communications department made it easy for you train delayers," McConahay cut in. "We had our new carrier system all ready to tie on. Then we hooked temporary extension lines to the machine at Marion, waited for an open spot in traffic, and loaded it aboard a baggage car. A dispatcher climbed in after it and went on putting his trains across the road until a second traffic lull gave us a chance to cut the wires and high-tail the baggage car to

Get smooth, seamless walls with Gold Bond Gypsum Wallboard and Tape System

You can have expertly finished walls by following this simple procedure. Just nail Gold Bond Gypsum Wallboard to wood framing and treat the panel joints with Gold Bond's easyto-use Perforated Tape Joint System. One package contains all the joint materials you need for the average room... including the bedding knife. Here is how it works:



APPLY CEMENT, Fill each channel formed by edges of tapered-edge wellboard with Gold Bond Joint Cement.



EMBED TAPE IN CEMENT, Center Gold Bond Perforated Tape in channel and embed in cement, using 4" putty limits.



SMOOTH DOWN CEMENT, Smooth down cement forced through tape perforations. Coment all naitheads.



FIRST BEDDING COAT. After 24 hours, apply thin coat of cement and feather out 3" to 4" on each side of chancel.



SECOND DECOMING COAT. When cement is dry, apply second thin coat Feather out 8" to 10". Give nairheads second coat.



SANDING, After 24 hours, send cement level with wallboard surface. Sand lightly—don't scuff paper surface.



PROJECTS BET DONE FASTER, EASIER with Gold Bond Building Products

- because they re made together to work together Insist on the
best—ask for Gold Bond - Gypsum Wallboard and the Perforated

Tapo Joint System. Send 10r for plans of room illustrated a list of
other room plans available and additional wallboard information.

Write to National Gypsum Company, Dept. PS28, Buffalo 2, N. Y.

NATIONAL GYPSUM COMPANY

BUILDING PRODUCTS



"Husky Boy" air-cooled arc welder

Welds enywhere, Easily mounts on truck or trailer for getting to those profitable emergency repair jobs Light, rugged, compact and air-cooled. Fine for fabrication purposes and tough enough for continuous op-eration on light of medium production work.



AC welder—AC power

200 amp, combination that you can connect to your own power source Lets you operate where no power lines are available Furnishes cur-rent for welding and power for runming tools, lights, motors, atc Build your own combination welder and power unit with a good used auto engine.



utility AC shop type welder

Welfing Lussons eval serviceability make this 200 pages a popular model for small shops in model for small evaluated in and service shops plumb ing and hearing contractors Self-leach farm welding etc. Has same if all modes frial modes HOBART BROTHERS COMPANY Box P-28, Troy, Oh-o. Ph. FE 2-1223
HOBART BROS, CO., Box P-28, Trey, Chie without ob gation, send me complete information on 1 "Build Your Own" [2 "HUSKY BOY" Air-Cooled 3. A C Weider-AD Power [4. Shop Type AC Weider

State.

The Robot That Runs a Railroad

Perry. The machine was back in business in a couple of hours. At Manilla we were able to make a transfer without the bag-

gage-car hookup."

Like castanets, for the next six hours the relays behind the panels clicked steadily. Outside the office, unseen by Bill Kelly, a continuing parade of long yellow passenger trains poured in and out of Perry. Three of them, the "City of Denver." "City of Los Angeles," and "City of San Francisco," eastbound, chased each other across the board in the form of tiny lights that were rarely more than two reporting stations apart. "The minimum air cushion between those babies is four minutes." Kelly said.

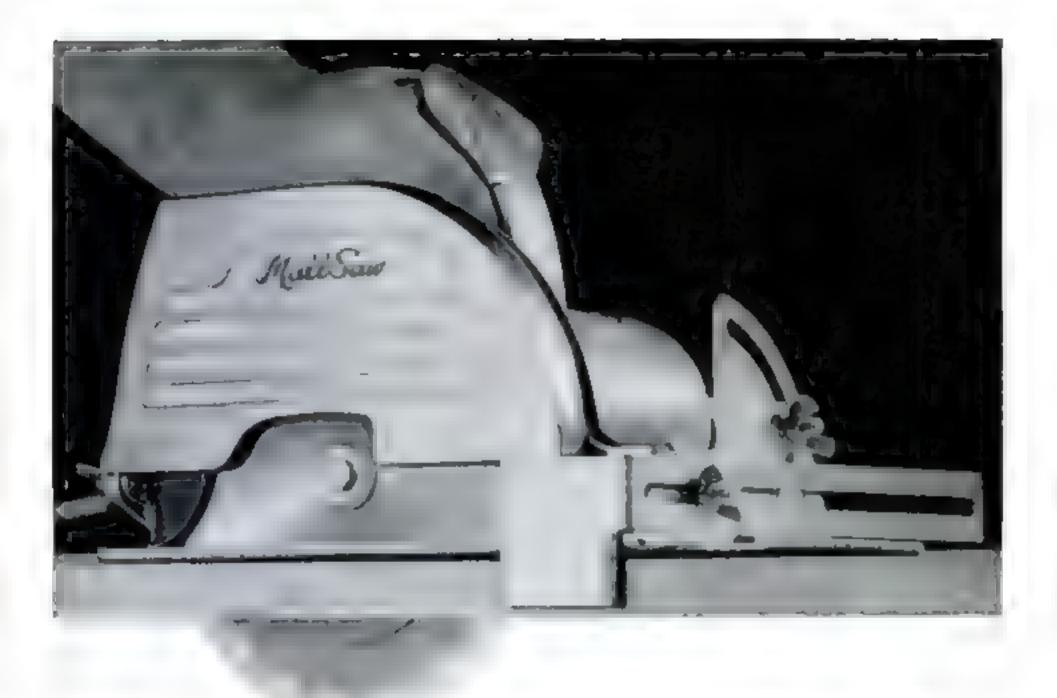
Intermixed with the streamliners were the hardworking freights. The voices of trainmen with cars to set out and pick up on sidings came booming through a loudspeaker, requesting signal protection and the authorization to unlock handthrown switches. Each time. Kelly checked his board. If the move could be made without stabbing traffic, he flicked his levers and punched the right actuating buttons. As a further precaution, he slipped little composition tags over the buttons to lock them. He didn't remove them until he got a second call, advising him that the switching movement was complete.

Backing up Kelly, J. D. Galiher, night chief dispatcher at Perry, came in a dozen times for a look at the ribbons of tape that inched along below rows of magnetically controlled pens in front of each machine. As trains progressed across the division, they actuated the pens, one by one, and tiny jots appeared upon the ribbons. When Kelly connected the dots with his fountain pen, diagonal lines, moving toward each other, showed him where east- and westbound trains would meet, and when. He set his passing-siding switches and signals accordingly.

By down it was clear to us that Centralized Traffic Control is an infallible railroading robot. But it's a robot that makes stern demands upon its human coworkers. The real plaudits go to the McConahays who keep it healthy, and the Kellys who must make split-second decisions each hour of the day and night to take full advantage of CTC's amazing END

traffic potential.

Address.



Remington 7-Inch circular saw gives you an extra deep cut with power to spare!

Ideal for home workshop or maintenance. Model 71 has depth capacity of full 23/4" at 90°; will cut through 2" lumber at 45°; speed: 5000 rpm. Powerful 25-60 cycle motor rated at 8.4 amps. Telescoping blade guard; one nut adjusting depth and bevel shoe; ball and self-lubricating bearings; weight: 834 lbs. 10-ft. cord, plug and ground; blade and wrench included. Ask your dealer to show you this powerful saw-it's your biggest saw value!

MALL TOOL COMPANY

Division of Remington Arms Company Inc., Bridgeport 2, Conn.

* In Comadex Hall Tool, Ltd., 26 Queen Elepooth Street, Toronto, Ont.

*Specifications and recommended list prices subject to change sorthout notice. Priese stightly higher in Canada.

TWO MORE POWERFUL REMINGTON TOOLS



Sturdy 14" driff. Model 1498, complete, \$28 50° | Model 31, complete, \$89.95°



Rugged belt sander,

Moil this coupon today!

PREE 16-PAGE CATALOG shows every type of Remington plactric tool by Mall. Tells what each will do-gives prices and specifications. No cost, no obligation. Just send in this coupon.

MALL TOOL COMPANY

Division of Rewington Arms Company, Inc. Bridgepart 2, Connecticut

Places and on FREE ILLUSTRATED CATALOG.



ADDRESS	70 NF	STATE
ADDRESS	_	
H 4 har		
I MARKE SHIPE INT LEGE ICCORT WH	A DESCRIPTION OF THE	

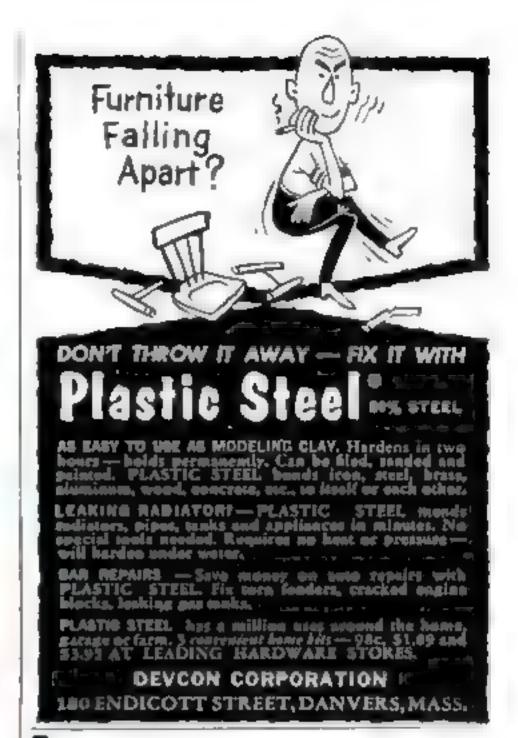
It's like employing
your own personal mechanic
to keep your engine
always at its best



The superior lubricating
qualities of Kendall SuperB mean less
wear, less need of repair. Oil and gas mileage
go up. Noise level goes down. Driving
is more economical, more enjoyable with
this Ail-Weather SAE 10W-30 oil
refined from 100% Bradford Pennsylvania
Crude Oil—richest in the world.

Ask your favorite dealer for it now

KENDALL REFINING COMPANY BRADFORD, PENNA.





Put spare time to profitable use by selling "your own brand" automobile polish. Made by a firm with a more-than-50-years' reputation for quality products, the polish is absolute tops in making a car gleam—as you can convince any prospect in a moment's easy demonstration.

Start as small as you wish, make your business as big as you feel you can handle... you're "the boss" in every way. Palish moves fast and profit is surprisingly high. And you can have an exclusive territory—an ideal setup with repeat orders so certain. For sample and sales details, write

C. P. Baker & Co., Dept. 1- A, 501 N. 11th St., Philadelphia 23, Pa,

OLDSmobility

The new way to travel that takes you out of the ordinary into the Rocket Age!



... and engineered for excellence throughout!

Oldsmobile for 1958 is engineered to be both rugged and right! For its new Rocket Engine is writing this year's big economy news... with multiple engineering advances that boost efficient action to a brand-new high! Just try it and see how new camshaft design... new manifold design... 10-to-1 compression ratio... all combine to make the '58 Rocket the road's most talked about performer!

Even comfort's callbrated to the nth degree in Oldsmobile... with exclusive New-Matic Ride*! For here is true air suspension. Four air cushions of tough rubber-nylon give you a variable rate ride, smooth and level whatever the road

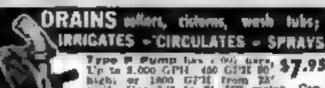
or load! It's a "closed system", too, meaning dependable performance with minimum upkeep. And wait'll you see the brilliantly engineered accessories . . . like Oldsmobile's all-transistor Trans-Portable Radio*, It's actually two radios in one. With its own speaker and 160-hour batteries, the Trans-Portable plays inside or outside the car.

Wherever you go, you go with extra value in an Olds . . . with such features as Safety Plate Glass all around! Clearly the '58 Olds is a car in a class by itself! But judge for yourself . . . as your own test driver . . . in a Rocket road test soon!

*Optional at extra cost







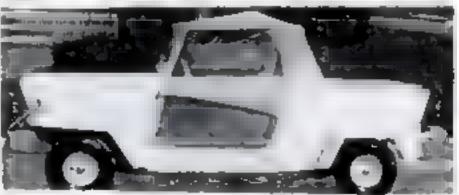
Type F Fump has a 00% days, 4 - 0 5
Lip to 2.000 GPH 400 GPH 80
high; or 1000 GPH from 25'
well Use 1/8 to th EIP metry. Conpling beladed free 1' inlet 44' outlet,
light on the type Ball-Bouring a 10-95
pame. Up to 7,500 GPH,
14." inlets 1" outlet.
read with order Aim other than, topas,
money Cacit Cuaranter.

PRODUCTS CO., LONGMONT, COLO,

Profpold of such LABAWCO PUMPS, Belle Meed 3A, N. J.

WATER SYSTEM Comp stely Automatic 49.95 per W th 14 11P Drotte Gent Pemo T'S G'H. 20-40 be. 44" Sittage. Free Gircular





ALL NEW. First model change G MIDGET in six years. New bodies, new chassa, new engine. Four wheel bydraulic brakes. Still World's Lowest Priced Car. Drive it for 75# per week. Rider Agents Wanted. Earn your own car, Get the facts. Send 25¢ for 32 page picture book with complete details, dealers proce, etc. if there is no dealer near you MIDGET MOTORS CORPORATION, Athena 2, Ohio



New...Safe...5-in-1 Tool! PERMA-GRIT WHEEL

SAWS, DADOES, SHAPES, SANDS, PLOUGHS

This amazing abrasive wheel is the safest and most useful accessory ever designed for table and radial saw use. It's actually 5 tools in 1! Saws, sands, shapes, dadoes and ploughs. And you never change the blade. With tungsten carbide grit permanently bonded on edge and sides, it's the slickest cutting blade ever developed. Cuts and sands wood or composition material in one operation! Even cuts laminated sheets without "pull outs." Coarse grit (36) bonded to edge and one side; other side has medium grit (80). And with no teeth to snag or drag, the Perma-Grit Wheel is safe. No kick-back . . . will not throw wood. One 8" Perma-Grit Wheel with %" arbor. Five tools in one, only \$12.95.





PERMA-GRET HAND SANDER—Outlasts hundreds of sandpaper sheets. A complete kill includes I Hand Sander, 1 Medium-Grit Sheet and 1 Fine-Grit Sheet only \$3.45.



PERMA-GRIT FILE— Full 14" blade size has coarse grit on one side and medium grit on other side. Unlike other rasps, the Perma-Grit File resists loading. Only \$2.25.

SKIL Corporation, D	Pept PIC-28
5033 N. Elaton Ave.,	Chicago 30, III.
In Canada: 3601 Dur	idas St. West, Toronto 9, Ont.
Gentlemen:	
	nplete information on
Perma-Grit producti	h.
Name	
Cleant	

Zone...

8'-TILT ARBOR SAW 957 MODEL-BELOW

BLADE TILTS-TABLE REMAINS LEVEL

Heavy duty all cost iron and steel construction. Precision ground cost from table. Price includes mossive cost iron mitre gauge and



Cross cuts, rips, bevels, mitres, dodges, cuts compound angles — everything expacted of sows costing four times as much. Depth of cut adjustable; O" to 21/4" — table always level. Send check or M.O. \$1.00 deposits on C.O.D.'s

SPECIAL BARGAIN - This sow is our 1957 model. Each sow Is brand new — sent to you in loctory sealed cartains. Sold and guaranteed direct from the factory to you at a fontastic bargain.

FREE 10 DAY TRIAL - MONEY BACK GUARANTEE

Try this famous saw 10 days. If you are not satisfied that it does the work of any till orbor saw, regardless of price, return for immediate maney back refund-

Sent Express Collect

We reserve right to refund money if stock is exhausted

AMERICAN MACHINE & TOOL CO. ROYERSFORD 2, PA.



Repairs in a Jiffy with DOT SPEEDY RIVETS

Literally hundreds of uses! Make or mend luggage, footwear, clothing, household utensils! Quick, easy fastening of cloth, leather, plastic, thin metals! A simple swat with a

hammer does the trick Speedy Rivets are available in 2 sizes. Only 15¢ per card. At hardware counters most everywhere.

Ideal for teen "bardware" beltal

look for the



as the package

COLUMBIA FASTENER CO.

3229 S. Ashland Ave., Chicogo B, Minois Subsidiary UNITED-CARR FASTERER Conjuration



HOMELITE "Carryable" GENERATING PLANT

2000 WATT AD CYCLE.

Single Phase, A.C. 115 Volt

Corrying bandles for easy portability. Fits

Gov't. Cost \$500.00

Save Hundreds of \$ \$ \$

PAYS FOR ITSELF! Saves time, labor and money Provides on the and power for (ONSTHECTION, e.e. where Buschmier none to availe de or experence to run to LARGE EXDIGE for Floor bests have 2'or do a line, a motor most saving beavy-duty machines. There are a second power point to a lease outper green. Plents of power for a a refragerator deep freeze thereof radio, etc. Specifications of the CAN THE MATCHED against on the little price of the Specification of the Land White 1.2 Years 1.4 Ample, 60 cycle of the control o putput based ent sertomo se vo tage, ego attos pina h rid Rosoutat for even closer ad astractit. Last than Vall Meter

ENGINE Care thempelife ample colliner coules. Air cooled two pattern that in assessment governor beautiful pressure rapor label

The Process of the Court of the SUPPLY LIMITED! IMMEDIATE DELIVERY! ORDER FROM AD

FREE Catalog of War Surplus-Wholesale Equipment ROCERTS ELECTRIC CO., Bopt, PS-756, 849 W. Grand, Chicago 22, 191.

> **NEW, IMPROVED CALCULATOR** FOR WOODWORKERS only 25c

Instantly gives information on lumber, mails, emocrete mines, painting materials, etc. Convenient, simple to read, Just met duat for pail specifications, to convert linear to based feet, find bet sizes for screws, compare characteristics of woods. 6' diameter heavily variathed cardboard. Send 15c, no stamps, please un Greenler Tool Co., 2. 22 Columbia Avenue, Rockford, Illinois.









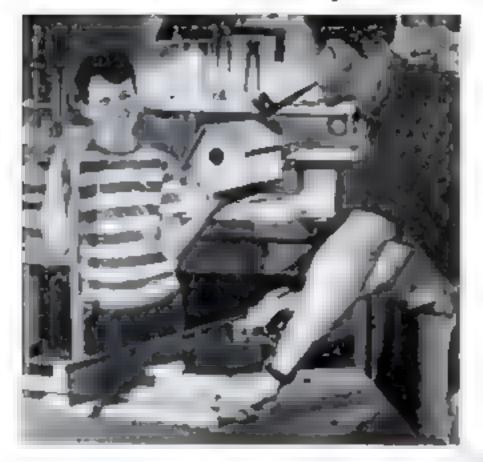
SAVE. . . on the Finest Quality Boot Kits. Prices, Motogony Decks, Frames, Premis Rocers, Crussers, Rundbouts. Over 40 Models of simple to comment boots and frame kills. SEND TOO POR NEW COLOR CATALOG.... Boots, Paints, Hardware, trailors, Chare gloss etc. Over 2000 Hems for your boot,

BUY ON EASY

CREDIT TERMS

By idlever Su rescent boots from large scale plats, grapitable with FULL-SIZE patterns, new PRE-FAB from k to 1 Air types prote to crusser, 6 to 25 ft. Best buy for Amoteurs: SEND On for CATALOG.

easier, faster, more fun...



Projects for your home made with

REYNOLDS

DO-IT-YOURSELF

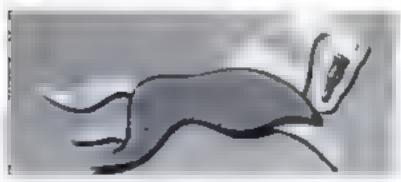
ALUMINUM

These are just a few projects you can make for your home with Reynolds Do-It-Yourself Aluminum—there are hundreds more. They're easy—they're fun—and ordinary woodworking tools are all you need. These free project sheets, and many more, are at your nearby hardware or lumber dealer. Or, fill out the coupon for the Project Sheets you want and Reynolds will mail them to you.



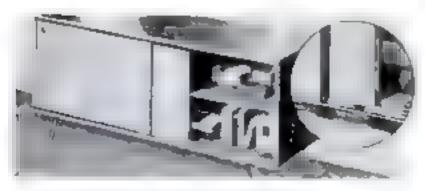
BACK PORCH SHELF

Handy for the milkman and for you. Keeps deliveries dry in had weather—holds packages white you unlock door. Easy to make.



DECORATOR PLAGUE

A hardsome stall on of aluminum and polished hardwood that you, and your friends, will admire for years. On—PROJECT SHEET NO. 30



SLIDING DOOR TRACK SETS

Now, the toughest part of cabinet making is eliminated with new aluminum Sliding Door Track Sets. Use in all cabinet work where you plan all ding doors—plywood, masonite, glass-lit perfectly—glide easily—in %" or %" double channels.



MODERN CORNER TABLE

A modern corner lable for your living room that combines the charm of wood and the elegance of aluminum. A project that's beautiful, functional—one you'll be proud to show. Request—PROJECT SHEET NO 27



LOOK FOR THIS RACK

You'll find—Sheet - Tube - Bar - Rod Fasteners - Screen and Storm Sash Sections—It's Reynolds Do-It-Yourself Aluminum headquarters.

Watch Reynolds All-Family Television Program, "DISNEYLAND," ABC-TV.

Send me Project She	ets for.
_	able (Project Sheet No. 27)
_	(Project Sheet No. 30)
Name	
Name Address	

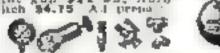
GIGANTIC INVENTORY EXCESS INV SAVE-TO-70% STOCK

AIR COMPRESSOR BARGAINS

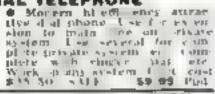
For using the cleaning these content for

prices in L S

Compressor tank cause resemble constructions that E5' Silk \$39.49 Follow Compressor 1 cs. \$19.85 2 m \$49.95; Compressor 1 cg, 519.85 2 m 549.95; root Ar Tank 50 70r Regular . 53.95. Pop On \$4.85; Pres unuge \$4.89 h nest aint gun \$4.2 85, Auto switch \$4.75 Al press



DIAL TELEPHONE



STORAGE BATTERY WINCH



a howertas fully rever ble but bearing gear reduce or while lines 2 and he puls Cattery Use on thor las fatters Note 50' of 11 excess For Irdebs duches bouts, foot pres 8200 \$46.75 FOR

WELDING GENERATOR

Pinest hal, bearing Jon amp Makes excellent welder hattery charger etc.

and car one 4 read buy



HUNDREDS SURPLUS BARGAINS

• Amazon surprus buss chousands of valuable items. Vechanical electrons systeming and electronics. Get our free illustrated

BOLF ELECTRIC CAR MOTOR



· Lou gulf or boys electric rar teared 100 to 1 Run 0 or 12 vots Easily re very ble Full Instr. Wi 34 the Govt cost \$250 FOR \$19.46

POWER PLANTS & GENERATORS

• Marke his buys to new condition Governand fact by surface plan s and generators. Write Incl. 'S' for extaing and generators



0 25 80 w 115 v 60 c 9239.50 0 3 88 w 115 v 60 c 299.50 0 5088 w 115 v 60 c 407.50 3kW 115 v Dt Generator 40 60

SPECIAL OF THE MONTH!

War surplus brand new expensive Biackhawk hand hydraulic twin parton pump. Pressure to 5000 lb. 394 cubic in. displacement.

Wonderful for wagon un-loaders, shop press, lift trucks, etc. Wt. 35 lbs. Gavt. cost over \$100 \$23.95 FOB SALE

MYDRAULIC SPEED REDUCER



The Variat of hydrau is appeal of the for Many speed from 0 to 750 speed by simply howelly a over liand of up to 1 by his for midget rate when Cap for midges cars shop band asws. etc liseant re weeks Lort cost \$4 of \$47.51 FOR

SURPLUS WATER HOSE



Marvesous buy now 20-st tengths) 4 (fpm class e or is threaded to pe aligness Stand pressure to 25 due Wi HALE LIST BIR SU

DRDER FROM AD or write for calalog.

BURDEN SALES COMPANY

824 West "O" St., Lincoln, Nebraska



PUT STOCK#SI SHOPE

EASY TO GET AT!

With ONE HAND you can reach and get ... instantly ... exactly the size and type of screw you want "STOCK your SHOP is a smart, new, convenient, and economical way to buy and store screws. I rya few hones. You'll like thero!

SCREWS PLASTIC BOXES

FOR EASY DRIVING, ALL WOOD SCREWS ARE SPEEDIZED

An invisible lubricating film on "STOCK your SHOP" Wood Screws makes them easy to drive in even the hardest woods. This free extra feature eliminates bent and broken screws, presents sore and aching hands. Ask for \$10Ck your \$HOP the next time you buy screws. ELCO TOOL & SCREW CORP., ROCKFORD, ILL.



NEW! FOR FINISHING WOOD EDGES



WELDWOOD FLIDUBLE WOOD TRIM

Real wood veener paper backed, in handy rolls, of edging plyword, lumber Many decorative uses. Apply with Contact Cement, or Presto-Sel-Clue Oak birch, African mahagany, walkut, fir, Scinito 5 At your tember dealer &

SAVE Cost 89¢ same in roll B a 1" specify wood. Send this aid with 50¢ to united States Plywood Carp., Dept P\$ 2.58.55 W 44th St., N. Y 36, N. Y.

MINIATURE MACHINE SHOP



ctory in the May Issue. If you want a reprint of this story plus complete informatton about this amusting 10 in 1 combination precision tool write to

AMERICAN EBELSTAAL, INC., WHINAT DIV. Bopt, 128-358 B'wey., K. Y. 13

"ARCO-SAW" does more than a \$100 portable saw!







Hulld anything from a bookease to a bungatow with this rugged portable saw Fits any 'a" drill Rips & crosscuts up to 2" board. Exclusive "Dado-Arbor" adjusts for cutting grooves up to 1," wide x 1" deep in ONE CUT! Not even a \$100 pertable saw has a dade cutter. Has Depth-Bevel Rip Gages. Safety yoke permits 1-hand operation incl. 5" blade

Az Your Dezier or order direct on our Unconditions) 20-day M Rath Quarterer, Send theck. M.O. (ppd.) C.O.D. plus post,

ARROW METAL PRODUCTS CO. Dest. PS-2=421 West 202 Street+ New York 34, N.Y.

1. Measure and mark center points of two facing walls, disregarding bays, al-cover, etc. Snap a chark line between these marks. Mark another line at right angles to this line through its exact center. Put an uncemented tile in one corner of the crossing chalk lines.



2. Work from center tile, laying a row of uncomented tile from wall to wall. If border is less than half a tile, take up one tile from opposite end of row and move the row away from wall half a life. This will cover the other chalk line, so snap a new line, parallel to and one hatf a tile from the covered line.



3 Spread a 11/2 ft. path of adhesive along one side of your two center chalk lines. Resnep chalk line wherever adhesive may cover it. (Use easy-to-apply Milmark Rol -On Adhesive) Let adhesive "set" (get tacky), Lay tile on adhesive along both chalk lines, wall to wall, but not in border areas.



4. Cement two quarters of room (exclude border space) When adhesive "sets" lay tile, working away from center Do not slide tile into position, place and press down. Cement third quarter before tiling second quarter and so on.

Yes! You can install a HAKO TILE FLOOR in a single afternoon

its easy... its fun... its economical

You can enjoy a colorful Hako Tile Floor at amazing low cost by installing it yourself. You can't buy a smarter, more economical floor than Hako. It lasts for years . . . is easy to keep clean...and comes in a wide variety of colors and patterns in Asphalt and Vinyl-Plastic Tile. Save money—see your Hako dealer soon. He's listed

under "Floors" in the classified telephone book.

Send for complete instruction booklet & tile selection chart

NAKO BUILDING PRODUCTS

Division of Mustic Tile Corporation of America

Dept. PS2, P.O. Box 128, Vails Gate, N. Y.

Houston, Tex. . Joliet, Ill. . Long Beach, Calif. . Newburgh, N. Y.





5. To mark border tile, place loose tilu over last row of cemented tile. Place another tile on top of loose tile Using top tile as a rule, mark tile underneath for cutting Mark enough tils for one wall at a time. Then cut.



6. To cut tile, first heat back of tile over hot plate, gas burner, etc. Cut tile with sharp book knife. (Hako Vinyl-Plas-tic Tile can be cut with household shears.) Spread achesive in border area and place tile in position.

Complete All-Family Power Work Shop Dremel Moto-Shop is the first real multi-purpose workshop designed for the whole family. In one compact, portable unit you have a jig saw, disc sander buffing whee beach grander and a flexible shalt machine 3 power tools in I unit that do 1,001 jobs. For the k ds it provides hours of constructive creative recreation its invaluable to Dad, and even Yom for hobby work and home maintenance Moto Shop is not a toy but a professional-quantly power too, with a ball bearing rotary motor it s super sale cuts 4,0 wood, metal, plastice etc sets up anywhere, can be carried from

edel 571 J.g saw with disc sander attachment Medel 571

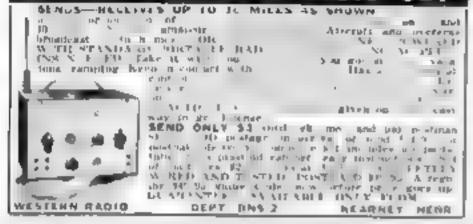
NEW!

Model 573 (with all attachments shown) . .

room to room. Outp rforms heavier, more expensive Jig saws. See your power tool or holiby dealer today.

FREE Mota-Shop Catalog, Write today! DREMEL MFG. CO. Dept. 1288, Racine, Wis.







Albert Constantine and Son, Inc. 2054H Eastchuster Rd., New York 61, N. Y.

had. New York 41, N. Y.

Enclosed 506 (refunded on 1st order). Send Catalog and FREE "Chips and Chats."

Addrson

262 POPULAR SCIENCE

ONE BIT FOR ALL

Handlest drill bit made Use on any electric dr. i lathe drill press, etc. electric dr. it lathe drill press, etc.
Made of finest American hi-speed
steel 3 / ong 4 diameter Has
I side culting section. Cuts steel,
wood plastic aluminum etc. 3 (speel
specify types wanted it All purpuse (2 Wood 3) Heavy metal
13 15 coch = 1 for 17 50 - Postperd
Money back guaranteed. Buy from
hour denier or send check or Money. your dealer or send check or Money Order and name of favorite toul draier TODAY (Makes ideal gift)

SAW • REAM //- SMED-SAN DRILL BITS Jobber & Genter

Inquiries Invited

BEAVER DRILL & TOOL CO., 3008-A McGon Traffirmay, Konton Ciry, Ma.

the right glue for every job you do

ELMER'S® GLUE-ALL!

and other Elmer Glues



16 ways to make STEADY MONEY

with an International Cub® Lo-Boy®

If you're looking for a profitable spare-time business for yourself... then see how you can make steady money with an International Cub Lo-Boy! Jobs listed here are just a few of the many you can handle completely with the low-cost, 10 hp Cub Lo-Boy. You can get started for as little as \$250, pay the balance monthly as you earn. Write International Harvester Co., Dept. PS2, P O. Box 7333, Chicago 80, Ill., for information kit. Write today!

Mow Dig holes

Plow Saw wood

Disk Spray trees

Drag Pump water

Doze

Excavate Load

Clear Haul

Enow Tow

Mix

concrete Sweep







ANOTHER OF INDUSTRY'S

MOST-WANTED MEN

General Electronics
Technician—exceptional opportunities for men with basic training I.C.S. method prepares you quickly and at low cost.

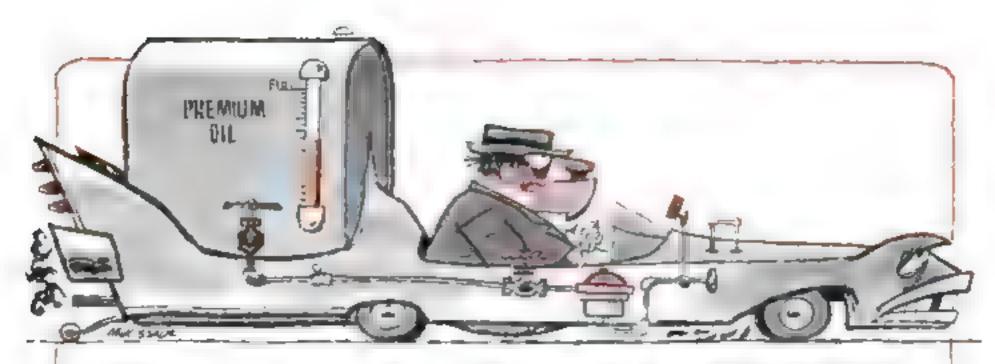
SEE SPECIAL OPPORTUNITY CHECK-LIST-PAGE 51



Over 100,000 Warn Hules are new in use, proof that free-wheeling 2-w.d. with Warn Hules means but arvises to aver, eneme, tire weer, East, Alley

Over 100,000 Warn Hubs are new in me, proof that free-wheeling 2-w.d. with Warn Hubs means big awaigs in gear, engine, are wear, gas, play more pep, performance, power in high and easier steering. Now, with Warn Lock-O-manes, you have economical, drag-free 2-w.d. or tractive 4-w.d. dealer matically, as you shift! Ask your local 4-w.d. dealer to matall Warn Lock-O-mane in Locking Hubs to-

WARN MFG. CO., Riverton Box 8064-1-2, Seettle 88, Wa.



Using too much oil?...call for HASTINGS

Excessive use of oil is your first sign of wornout piston rings. And worn-out piston rings mean power drop-off-costly wastage of gas and oil-expensive repairs later on.

See your motor specialist the minute oilpumping warns you there's trouble shead. When he recommends new piston rings, ask for Hastings. They're engineered exclusively for replacement service . . . to stop oil-pumping, save gasoline, restore lost performance.

Get new car performance from your present car-with Hastings. Truly your best investment for thousands of extra miles of trouble-free driving. Hastings Manufacturing Co., Hastings, Mich. Piston Rings, Casite, Wear Reducer, Oil Filters, Spark Plugs

TOUGH ON OIL-PUMPING GENTLE ON CYLINDER WALLS



HASTINGS PISTON RINGS



Wash off old paint with water!

Amazing how easy it is to use this miracle new WASH-AWAY Paint Remover. Just brush it on . . . wait a few minutes . . . wash off with water - your surface is clean, ready to refinish. Ideal for removing old finish from delicate antiques. Fine for outside use . . . siding, shutters, porches, boats. No scraping! Nonflammable!

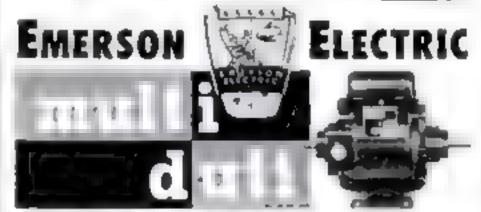
AT SHERWIN-WILLIAMS DEALERS EVERYWHEREI

listed in yellow pages of phone directories

PREFERRED

by Leading Appliance Manufacturers

NOW AVAILABLE TO YOU!



MOTORS

First choice of manufacturers for 67 years! Now you can choose from 21 different designs from 1/4 to 1 H.P. Write for free catalog No. M-162. The Emerson Electric Mfg. Co., St. Louis 21, Mo.

of St. Louis ... Since 1800

ORDER DIRECT FROM AD

SEND PAYMENT OR PURCHASE ORDER TODAY

PHONE WEBSTER 9-3793

SURPLUS AND NEW MANUFACTURE SHOP BY MAIL AND

SATISFACTION UNCONDITIONALLY GUARANTEED

60 PAGES Sensational Values Offering ansurpassed war surplus & new equipment bargains by form, home factory, workshop, elc Write teday

BRAND NEW

WALKER 5-TON HYDRAULIC LIFT KIT

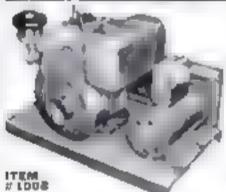
FOR - . SNOW PLOWS . TO DUMPFARM WAGONS . ADJUST DEPTH OF PLOWS . NYDRAU. LIC PRESS . HYDRAULIC JACK. THE COMPLETE KIT CONSISTS OF: 1 Walker Hydraulic Hand Pump-Rated 1500 ibs per sq.

bandle, Fine for hydraulic presses, snow plows, jacks. Dimensions 6" Diameter, 29" long with "," pipe 23.50 long by long throad port Pump Assembly Rem = P449 1-8 Pt length double wire braid rubuer covered 3.95 bydrau ic hose tested to 20 000 bs Item = 2 B4 1-Hydraulic Cyonder 3" bore, 6" stroke Hushy 3," solid stee, shaft Will lift 10 000 lbs using 1500 lbs of pump pressure Clevis mountings that take 3," dismeter pine May be used for single or double action service Over-

f-Gallon hydrausic fluid furnished free with each hit Plus all necessary hydraulic fittings. Total thip wt -48 lbs

OMPLETE KIT PRICE (ALL OF ABOVE (NCLUBED)....

38.95 POB. CHICAGO



PORTABLE 1000 WATT A. C.

Electricity For Your Comfort COMPACT-

Fits in the truck of your car FAST STARTING

ENGINE: CLINTON 3 6 H.P. Mahual Start

GENERATOR: Ball bearing construction 1000 Watta, 115

SAME AS HOUSEHOLD CURRENT

201 y" x 12" x 16" Shipping Weight 100 lbs boxed SIZZ PRICE: Save \$110 00 from \$259 PRICE: price. Now! FOB Chicago. \$110 00 from \$259 50 list

GROBAN

FOUR-WAY

OPEN CENTER

HYDRAULIC CONTROL

#124-Four-way open center control valve. with built in adjustable relief valve factory set at 1000 P S I. Spring loaded neutral position. For use with one double acting cylinder in neutral position cy inder is locked and pump unloaded. Can be used as single unit or mounted in series. Has %" pipe thread inlet and outlet. 15 pipe thread cylinder ports. Finger grip hamille Ship, wt. 10% lbs.

IYUB SMIGHATETUG MA

NET

FOB Chicago

1% H.P. HYDRAULIC SPEED REDUCER



with FINGERTIP CONTROL

USC FORI & Reamer Brives # Miletel
Co. 1 # Ford Miles & Canning Machines & Conveyors & Lathes # Miling Mach nes & Motor Boats & Cream
Separators & Garden Tractors
OUTSUT & Pamps

Variable output speeds from 9 to upoil apress availables by moving control handin. Locking and emission to setting the in-In oil rotation counter Diam'r. miching fact g shall labus speed of the M 719" x "m" n 11 - " that

Hem 2 635 put rolation reversible, Ships wt 31 ba. t umplete wirb 72.50 equa, of oil and full instructions. FOB this ago. ...

MULTI-PURPOSE

HYDRAULIC PUMP OR MOTOR

Silent, high efficiency Helical Gear Type Bail Bearing. Hydraulic Pump of Motor Bated & Oal Per Min. At 1500 R P M. Dedvers 1000 PS; Using 4 HP Reversible Rotation 1, Pipe Thread in et and Outlet Puris-1, Drain Port-1, and first with keyway and flat for either direct or puller drive Dimensions—5, high. Tie land 514. wide Shipping weight 18 ibs POB

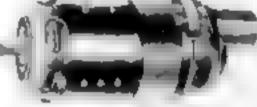
52.50

ITEM # 58

FOR WELDING, BATTERY CHARGING, ELECTRO-PLATING GENERAL ELECTRIC D.C. GENERATOR

ITEM #0-476--400 amps., 30 volts D.C., using up to 20 HP 3700 7200 R P M. Rotation counter - clockwise "," opline shaft. Dimensions: 1814" long

CI KARO



x 714" deep. Shipping weight 75 lbs. 47.50 chicago SHAFT DRIVE COUPLING from 3.95

37-PIECE METAL STAMPING SET STAMPS HAMES, NUMBERS, ON WOOD OR METAL





2 FOR 10.00 Pod

GROB



YOURSELF JIFFY! WELD

Weld, Cut, Braze, Solder: from Steel, Braze, Bronze, Aluminum and other metals safely and easily. Make your wrought from furniture purch railings, feaces, knick anacks and other metal specialties. With this fine equipment anyone can do professional like work with little practice. The Dynamic is an industrial type transformer are walder designed to operate from any properly wired 110 volt AC line

Order your Dynamic Industrial type transformer Arc Welder for Workthop or Industrial use teday. Order from this ad.

Liturature en iergar aquipment available en request.

DYNAMIC WELDER COMPANY, 1808 1, federal Street, Dept. 01-8, Chicage 16, Illinois

EAST PAT PLAN Low down payment.

Pay as you weld.

Money back Fueran-

see. Complete outfit.



Modernize with Marlite for years of wear, just minutes of care!

Give any room in your home a bright, new look with beautiful Marlite. This easy-to-mittil paneling in sheets, planks or blocks goes up fast over old walk or new with simple carpenter tooks. And Markte melamine plastic finish results dirt, grease, slains, menture. It cleans with a damp cloth; stays like new for years. See your building materials dealer for Marlite in distinctive "Companion Colors," marble patterns, wood finishesor write for free decorating ideas book. Markte Division of Masonita Corporation, Dept. 226 Dover, Ohin.







plastic-finished paneling

ANOTHER QUALITY PRODUCT OF MASONITE! RESEARCH

there's money

IN THE ORNAMENTAL CONCRETE BUSINESS

Minufacture-and self-ornemental coverage products powself. Easily, symply produced, here is a low-cost, doityourself project that means money--Big Manay.

CMC permanent. (fight-weight, high quality Absolution Makes give you both case of production and copyrighted designs. But have set a subonel record of sales success.

Get the full story of this high profit, love cost business. Send today for your copy of the big, fully Montrated book "Now in Turn Concrete into Gold." The clear, nestly followed Years start-to-finish instructions' that show you how to produce heartiful, preamertal concrete products. Plus solboble nates and market tigo. Catalog of over 200 Specialty Molds. A complete reductry manual.





GOT A LOCK PROBLEM? To make locks work easier and last

longer, add a few drops of LOCK-EASE to any lock mechanism. LOCK-EASE —a graphited fluid flushes out dirt leaves a long-wearing protective film to seal out rain, show, salt, ice and dust that cause locks to stick, rust and wear out. LOCK-EASE prevents keys from sticking ... locks from freez-

ing. Use LOCK-EASE on car locks, garage locks, padlocks and all door locks in and out of the home. For best results, "LOCK-EASE" locks regularly! 4-ox. "Drop or Stream" can only 49c, everywhere.





AMAZING, PERMANENT, NON-ELECTRIC, HIGHLY PRACTICAL.

Conduct preparing experiments. Hundreds of uses. Rad have valuable asset I sink such as many tarkle from fresh or as I water tools in the tark a " " BUARANTEED Try any matter one work in the fact at " " BUARANTEED Try any matter one work in the fact at good are no work in the fact at good are no work in the fact at good are no in the public of 205 lbs on steel block \$ 9.50 No a 225 Wt 10 at 1 Has public 193 lbs on steel block \$ 9.50 No a 225 Wt 10 at 1 Has public of 30 lbs on steel block \$ 4.50 No a 225 Wt 10 at 1 Has public of 30 lbs on steel block \$ 4.50 No a 226 Kd of Reside Rocks & Pairs 10 Magnets

No a 226 Kd of Reside Rocks & Pairs 10 Magnets

No a 126 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Reside Rocks & Pairs 10 Magnets

No a 326 Kd of Rocks & Pairs 10 Magnets

No a 326 Kd of Rocks & Pairs 10 Magnets

No a 326 Kd of Rocks & Pairs 10 Magnets

No a 326 Kd of Rocks & Pairs 10 Magnets

No a 326 Kd of Rocks & Tarre no C.O D 14

BIAMI MAGNET COMPANY, 3240 N. W. 27th Ave., Miumi 42, Fig.



Telescope Lens Kit Computer Story of St

BUSSE SALES CO., Hartford, Cons., Dopt. PS-64



The farmous super rapid fire "burp" guns, if you were with Bradley or Faston in Normandy, you remember the coughing back of those guns that were an tough to root out of the hedgerows. All complete and in fair to good condition. A real conversation piece and nouvenir for your trophy wall, den or freplace. These to good condition. A real are the extra fine precision automatic automation gone of early WW II. Barrels are plugged to conform with federal law on wer troph en. Triggers shap actions function perfectly and can be disassembled. YOU'R CHOICE of German Bergmann, German Schmeiner, German Brum. German Steyr Solothurn. Italian Servita and a few Scitch Laschesters. All \$19.95 such FOB Los Angeles. (Any two (or \$37.50) Send thack cash se money order. Send \$19 per gus for COD. 10 day money back guarantee

THE BLUMER COMPANY

Dept. 75 1206 Maple Avenue. Los Angeles 15, Calif.

KENNEDY all purpose tool kit...

LOW COST RUGGED PROTECTION FOR YOUR TOOLS ...!





A Kennedy quality value at low cost.

- Rugged steel construction that can really "lake it".
 - All you need for home or shop
- Dock brown a role baked enomel finish with contrasting dark green trays.



\$ 1,000 A YEAR SPARE TIME INCOME

Spend only 1 or 2 hours a day sharpening saws, maintenance tools, knives, etc. Versatile, low-cost Foley 314 Grinder (only \$133.75) puts you in this high profit business. You can make \$3 to \$5 an hour —aharpen just 3 saws a day, for instance, and you can put over \$1,000 a year in your pocket. You clear 95¢ out of every \$1 00 you take in! Thousands of farmers, home owners, schools, industries, contractors need this service.

FREEPLA Nahows how to get started, get customers, expand your business. Send coupon for information now! No obligation, No salesman will call.



you want by using your



ı

ı

FOLEY MFG. CO. 276-4 Foley Bidg. Minnespolis 18, Send FREE PLAN for space time home business with \$14 Grinder.	
Name	
Address	
44444444	

FEBRUARY 1958 267

Reneady Manufecturing Company Ven West Onen, Dept PS 2 Plante and name of necret Lennydy. Additons WHAT 3398

...DO YOU KNOW ABOUT HAND SAWS?

Good saw steel should be hard enough to its cutting edge and yet malieable h to be flexible. Only saw manufacturers who operate their own mines and steel mills can give you the uniform controlled steel consistency necessary in every saw blade. Sandvik Swedish Charcoal Steel Hand Saws feature this high quality hand saw steel. This is only one of Sandvik's many exclusive advantages, Before you huy any hand naw, ask your dealer to show you a Sandvik,

Write today for the new 16 page booktet... "Things You Should Know About Hand Saws", It's free - Dept. #\$.



Saw & Tool Division 1702 NEVINS BOAD, FAIR LAWN, N. J.

in Canada: P.O. Draw 1330, Station "O", Montreal 8



Build your own home and save the builders' profit—plus savings in lumber and labor with Sterling Ready-Cut-Homes. Anyone can assemble with aimple, easy to follow plans furnished Every house complete with all lumber, roofing, nails, glass, hardware, paint, doors and windows marked ready to erect. Freight paid. Complete building plans ready for filing at low cost Sold separately if desired. Write today!

PRICED FROM \$2150 UP Five Easy Payment Plons Send 25t for NEW COLOR CATALOG

STRAIGHT IN 'SE



America's favorite motoring guide for 25 years. At your dealer's or write for literature.

Ever-Dependable Sealing Quides, Tee \$6.95 and \$5.50

HULL MFG. CO., P. O. Box 246-E2, Warren, O.

AMERICA'S FINEST RIDING MOWER!

Enjoy the easy-going comfort of today's most exciting riding mower. You cut grass evenly, effortlessly, so safely a child can do it. You get real automotive steering too, plus Verm-matic Drive that lets you change speeds without stopping or clutching. With six Ridemaster attachments; you put riding comfort into outdoor jobs year-'round.



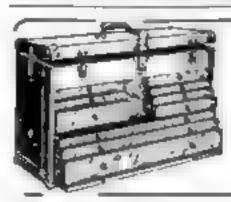
BOLENS PRODUCTS DIVISION Food Machinery & Chemical Corp. Fort Washington 6A, Wisconsin

SCHOOL 108 CATHLOC

POUR OWN POCKET SIZE RADIO STATIONS
BROAM ANTS TO ANY HOME OR CAR RADIO WITHOUT
WIRES OR HOCKITS! WE says & m. Sine (Marriage 44). Up to
the creat space antiches. Powerful Translator scan we
encounted the property of the terms in an interfor works on active contained flashing to the terms. Incase plantic case. With this Hadio Talkie you CAN
TALK TO FOUR PRICADS UP TO A BILLICK OF
WHICE AWAY Task up to I mile or more between
two actabolists. INSTANT OPERATION Just
much but ten to task! No license secret Uses indurious faid magnetic rediming Depth and ros
too he is the son way? GLARANTED TO
WHILE, I THAN SPRUICE GUALANTED

SENO ONLY SJ.OO. cash et. (40) son hay
much delivery COMPLETE READY TO OPERATY
with his providence and bundreds of ways and tricks
for broadcases thru may racks you design Price may
se up soon, no get your NEW POWFIFTE RADIO.

HER ARMET, MEDA



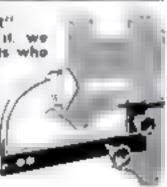
SATISFACTION

Know the satisfaction that comes from using a fine product, built to last Free Catolog to Machinists and Tool makers.

> Serstaur Tool Chests 556 Columbio St. Daytes 7, Ohio

"SAW GULLET ANGLE INDICATOR" After years of necessity, we invented it. we now make it, we sell it to saw experts who tako perdu in high class workmanship, economy of time, and file expense. You set file to procise, prodetermined position in only seconds. Designed for Automatic Power saw Filers, Complete with drill & top. \$15.00 in U. S. HODKER-HALL

419 E. Colo. Ave., Colo. Spgs., Colo.





132 PAGES Many in full color

packed with rare. fancy & imported woods veneers, plywoods patterms, too:s. ornaments, hardware everything for the woodworker

Get This NEW Catalog of & WOODWORKING

world's langest seleution of finest DOMESTIC AND IMPORTED WOODS . . . MOULDINGS, HARDWARE, TOOLS,—ALL AT LOW MONEY SAVING PRICES!

Your complete wood buying guide and project book. Craftsman is your best, most com-plete source of finest kiln-dried domestic and rare imported woods, beautiful wood inlays, colorful bandings, matched plywoods, embossed mould has, carred ornuments, newest woodworking toom, hard to find cablact hardware and fittings more than 1,500 items! Packed with newest scroll saw patents. terns, project ideas & money making plans, Enclose Ele (refunded with first order) to help pay mailing, handling cost. Write now! Craftsman Wood Service Co., But. 8-2 2729 S. Mary Street - Chicago S. M.

WAR SURPLUS TEET SAVE to

FAMOUS NAVY MK14 AIR COMPRESSOR Stirra tires, ste. Dual and remute control siec recentacies tiby 60 cycle AC 1.2 H.P. Westinghouse Moore Direct deve Draws to "of various Maier and Farmon storaged Bu It is due to ter, adjustable pressure as ting up to 47 the Bu It is pressure gauge. Self on a seed as a though the Albanting of the MI field like gives Appears 64 ST COST \$58. Like Only \$25.55. We hatcel hand cart radiose where as specially

remareur oil for mounting this up 1, 15° ruther air hise 6° escen such rurd with plug & fittings Wit 75 this C my ele \$26.50



BUILD YOUR OWN ARC WILDER, LIGHT

PLANT OR BATTERY CHARGER \$37.50 K | 116 1 Navy NEA 5 Gen of degreen At the type At 115 1 Dt 24 Y 200 line Amps 2 complete ge erasters in 1 yet in ancert them reg 5ch literal for house about and factor belonging plants the west 1200 Watta Af DK ange for charging batteries welding and operating war automated to the Art 12 to laste Begs AC A DK Reserve forecast Re at 100 new welding cable Breatata blee ride 10 see Tuggle Swotch We fer a Shaeld Wiring Diagram for his Will honder 100 ft a America Given Court and the State State

ARC WELDER KIT - \$26.00 Build your own comp ete make up package and I A creafi DC facts 200 Ampa 24 V Rheckett Toggle Switch 30° new wolding cable. Presents Butter Welder a Shreid, Village Reg. Biomple Inform to warring diagram W. mitter 100 ht Approx Colv. I that \$475 I he new, perfect As) un is guaranteed pre-tested \$20



R1 GENERATOR KIT Jack & Haints or GE. Rated 300 Ames. 24 32 V With same items so above. Approx. GOVT COST \$600. Complete 60 lb. 2.t - \$38.



6' BEAM COMPASS Tits in your yest cocket Draws etc. ses spira a scebes and e reles up to 13° for data attetch penul lines in alum num encased rest NFW Compasta to th 3 specia, push publicated oppd

Q.E.D. FLAT BEVEL SCALES

H sears on I nide Standard a se scale

13th | long & 18h | with the product of the Standard a se scale

scale freed bid he lighted over to find denoted healt graduated in

the 14 3h 5, 15 1 | the and I inches to the fact \$7.25 ppd.

Procket stan scale in 7.5 | long & 18h | with 52' reading on the

scale 20' on the area of All vigos parallel Can be used as a

straight edge. In leather above. NEW \$3.00 ppd.



EXPLOSIVE RIVET & BLOW TORCH KIT Count is 100 severted Dipont I uplosive Rivers, I set of 9 fractional de se I Busane Blow Torch with extra dark dige-everything needs) for and fiveling. Torch can also be used for precision at desing beginning etc. 35000 pings of Rime Appears GOVT COST on revets on the 200 c implete but \$2.75



DUPONT EXPLOSIVE RIVETS Casentist wherever thind rivet ng required, I Mr. S 12" 3 16". Round & Sat brack Appens GOYT COST 52c so 1,000 secorted for only \$5.00 ppd



PROPELLER SAROMETER A preciplus weather instrument inputated in
center of genuine such number radio draine
"prop" Perfect for den, trephy room, buy's from Samueth, highly variabled prope for. 30° to to to cost govt spares, 337
how, with harmester inserted, only 34 45 ppd Propeller separately can be used to operate ice steds, etc. NEW 44 66 ppd.

BENDIX GEROTOR PUMP & MOTOR

Use wherever fluid pumping required. Excellent for hydrausic install stome Has \$4" sipe connections, built in relief valve adjustable up to 1500 the Man one 5 GPM 145 H.P. 24 V motor Use on 12 to 35 V Approx GOVT COST \$350 NEW \$16.85.



8-16 KOLLSMAN AIRCRAFT COMPASS Idea,

for bonts, cars, etc. Grad. in 3" increments Liquid fixed. Lighted. Poly-plane compensator Pane, mounting 3"s" dis face 4.5" deep. Checked & tested in our own lab. Approx. GOVT COST \$150. Like NEW \$12.95 ppd.



ASTRO COMPASS MARK II Land by L RAF & com merc at a clines. Makes pet-gun & account that A com-or has ne has gat a Great for aurest mere their charg-ing case. Tested for accuracy to our own lat. Approx. GOVT CONT \$400. Now \$40.99

140-1 REDUCTION GEAR For beaching boats, winches, hoists liteal for motor in 2017 or boys electric car But tin removable DC motor & cruich. Hi torque, to spend fitting on 6-12 or 24 V WL 65 lits. großs. Appers GOVT COST \$300. Little NEW \$12.00, P225-1 REDUCTION GEAR, as above - \$12.50. 140-1 REDUCTION GEAR





ELECTRIC PUMP WITH CONTROL UNIT Runs on 12 or 24 V Centrifugal type Pumps 500 GPR-fine eve with an and off switch themstat, 2 appears the 5 to Mid to lugarment Rand Shor Wr. 7 Hot. Approx GOVT COST \$195 NEW 98 99

MRAVY-DUTY RNEOSTAT Ideal for regulating without on electric we detail Hated 3.75 Ounts. 1.02 Watto with do like windings & door female 25 amp. 125 V excepts les 7" hi x 514" D. Short at 215 lbs. Approx GOVT COST 823 Brand New 52.29 ppd.





ADJUSTABLE QUADRANGLE then seen many tera give Fight quadration of the feet of interest to every 30 does of any think a research of setting to 12 m or to easily of tained field arm to any descript of triangle fluid First beste Percentage Stope Scale 4 no Scale. Every edge a drawing edge Nt W \$7.50 pps.



CHRONOMETRIC TACHOMETER But t to 1' 8.

Nasy & A.r Furty spece S. andatt lies of Pur counting perclassions per mice for any role of grains Can be back on speeds up to 3000 RPM Area say us 1 10 of 17%, Complete with male & frame of the & shock-proof case.

GOVT COST \$87.30 NEW Only \$18.88 ppd.

HOMELITE PORTABLE POWER PLANT basel for weiging bettery charging, smergency lights for cabina, comps, e-reract, trailers or wherever power baseded. Easy rope pull starting Pully equipped ready to start, 2000 W., 32 V. 5 M.P. Like NEW Trailers. Shock mounted, Deture type Net wt. 115 lbs Gross wt. cased 200 lbs. Approx GOVT COST \$700 New — \$66 08, 2000 W — \$75.



MICROMETERS hipet crackle Aniali frame. Esquito read graduations in GOL NEW, 9-1" cap. 88 00 ppd, 1 3" cap. 83 70 ppd.



NEW! TERRIFIC! 1958 CATALOG! Thousands of bargains in war surgive 4 other items. Nundreds of potiers Send 35s for your empt today!

That prices in CAA only Other prices FOB Culver City. Calif. Send - 2 theck of enter 50 leptos. Lon COD

AIRBORNE SALES CO., INC. BOPT. PS258 .. 0501 Stellar Drive, Culver City, Calif. 1



Weise for trans, and diff 100 to 1 reduc-柳 計略 tion. 40% more drawbur pull dotalls, Engineering Products Ct. than ordinary tractors 5-1/4 915-A 2 Hiagara Ct. H. P. anglue. D quick ebanga Wantesta, Wiggingto Implements. HOOD, FENDERS.



Convert Rough and Random Size Lumber lete Cabinet Finished Stock

Now anyone can make perfect cabinet finished stock from low-cost rough Jumber...any size up to 12% inches wide and 6 inches thick Turn out high grade

finished material at a fraction of the cost you pay tumber yards. Big 42 inch-long bed makes it easy to plane heavy wide and long proces... BELSAW self feeds at 14 to 34 feet per minute.

USE THIS ONE LOW-COST MACHINE for Planing. Jointing, Sawing, Milling, Tongue and Groave.

highly profitable machine for custom work. Compare Betsiev with any 12-inch planer on the market ... Belsaw gives you more essential features—yel costs you \$50 to \$125 less than others.

Send Today for Free Literature on the Beisaw Multi-Duty Planer.

BELSAW MACHINERY CO 2068 Field Bldg, Kansas City 11, Ma.



Stundy would along and a uninum construction NEW PET that all but bearings to construct by and performance of Sone waws so link for \$130.00 and the Person of Sone ways so link for \$130.00 and the Person of Sone was a second for but with 100 and the Person of Sone was a second for but with 100 and 100 Persons of Sone was a second for but with 100 persons of the Sone was a second for but with 100 persons of the Sone was a second for but with 100 persons of the Sone was a second for but with 100 persons of the Sone was a second for the Capar ty and Pans at metal parts in hit with 10" blade \$25.90. less bunde \$22.96. ind up. F.O B. St Louis any \$1 00 postpard.

Build-it-yourself 1.2" and 18" Burdsaws, 0"
Belt Bander, Shaper. Simplified plans. Smild
askily with band tools unly. Advertised and
sold for 11 years, over 33 000 units in me.
Money back guarantee FREE CATALOS
GILLIOM POWER TOOLS, Dopt. 70-8, Lambert Field.



a Dexall short cut to natural wood beauty!

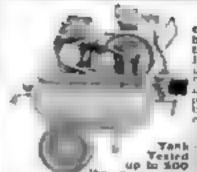
- · Easy way to modernize old-style wood finmhes
- Just apply . . . sponge off . . color's gone!
- Will not harm finest woods

At Paint and Hardware Stores Everywhere

DESHLER PRODUCTS INC. **Deshler, Ohio**



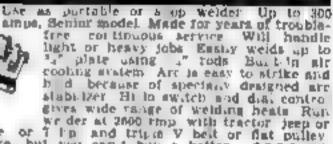
at dealer's prices



MASTER AIR COMPRESSOR

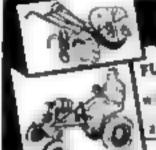
COMPAREI This is the only compressor built with a NO BLST vision era atcellant Sale up to 500 dbs. (Lem 200 lift horseware life of e for 1 force volume of a for beavy duty a day of interesting said ulasting such a auto three greating said ulasting out Photon you 3" horse compressor with but it had a life a life and pressor with but it had be a successful in horse on the pressor with but it had a successful in head and a motor to main and tested on he about the state of a motor to main and tested on he about the pressor with the about the second of the successful in the such as a successful in the succe

Rectary \$1 \ Hem 200 13 MP heavy duty model Rep Ind motor & unloader se 5 h m 10 \$129.50



15 hp gas engine or You cal pay more, but you can't buy a better \$119.50 welder Wt 110 lbs \$400 00 value.
WELDING KIT Two 10 ft leads, weiding helmet, electrode he der ground clamp Sold only with we der at

MARTER MECHANIC 40., Copt. 1-217 Burtington, Wis.



thage (rice 10)

MOWING

2 Lp 5 HP and reverse.

Proc Cutolog LOW PRICES with complete Giver 30 Years BASY TERMS Experience

FULLY GUARANTEEO! Over 60 attachments

available)

1016-A S. Blat Stront



KASENIT COMPOUND FOR CASE HARDENING OF TOOLS GUN PARTS, MACHINERY, ETC.

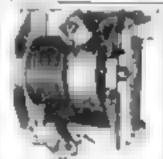
Easy to use Mondy No Special Equipment— NON Polsonous — NON Exp pt ve — NON In-flammable EPECIAL OFFER 1 LE CAN \$2.50 Postcold with Comp etc Instructions. MONEY BACK GUARANTEED (FOLDER FREE)

KASENIT CO. IEST 19121 7-8 KING ST. MANWAH, N J.

TANK TROUBLE?

NORTHEL Reactivator keeps aspile tank and compool clean. Bacterial concentrate breaks up solids and grease prevents overflow, back-up, odors, Regular use saves contly pumping or digging S mpsy mix dry powder in water, flush down todet. Non-poisonous, non-caustic. Guaranteed to reactivate septic tank, cesapool. Six months supply (28 ozz., only \$2.95 postpaid.

NORTHEL DISTRIBUTORS, PS-2 P. O. Best 1103 Minneapolis I, Minneapta



perfect HOIST and WINCH

First a was Barkbreaking Order a Small but Mah y Made is be used on B 29's for 1 - P a 10's 2 mile I capat y Wel 16 Dur Wich y Made is be used on it 25 s for it is not it is the prefect for 15 m in a m order in the Perfect for 15 m in a m order in the Perfect for 15 m in a m order in the Perfect for 15 m in a m order in the present of the presen

Write for cuta we hundreds of trems

WATIONAL SURPLUS SALES CO 1812 Charlotte Kansas City, Me.

"PULL-GEAR





Provides Correct Speed and Power to Drill Up to 13/4" with 1/2 H.F. Motor

A zing new internally - speed reducer doubles - 1 press capacity. Greater efficiency, presenter greater and a productivity. Provides the correct speed and power

for larger drilling, reaming, tapping and boring on hg it presses, Easily installed in five minutes. Adaptable to all type machines. Spindle speed range approx 45 to 3000 RPM Made in 8 motor shaft sizes: %"-%"-%". Write for literature.



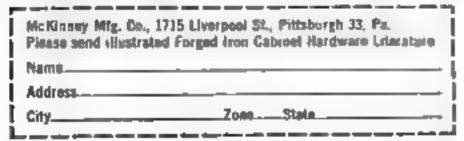
THE CO.

25429 Mound Road Center Unu, Michigan

DEALERS Chicago, III Chicago Supports Tool Co-Cleveland Ohio Resource Mark here Co. Lis Angeles, Latit Amaia st Boothers New York City Radoll Bass









Dexail Tack-Rag

For Finest Enameling and Varnishing

Simply wipe the Dexall Tack-Rag over sanded surface before enameling or varnishing. It picks up every trace of durt, dust and sanding particles ... assures a professional-looking job!

At Paint and Hardware Stores Everywhere

DESHLER PRODUCTS INC. . Deshler, Ohio

TROUBLESOME WOOD HATCHWAY?





REPLACE IT!

With a modern Bilco Basement Door. All-steel, weathertight, spring-operated. Do it yourself in just 3 to 4 hours,



Write today for FREE illustrated replacement folder.

THE BILCO CO., Dept. 117 NEW HAVEN 5, CONN.

	Please	send a	е сот	plote	Inform	etion	۱.	
NAME	*********			en lessarar		e	*******	
ADDRE	\$5	era da er ararra deslama					· 1941 · · ·	*****
CITY .			*********	104401	STATE	******	*******	





ACCURSED.

reproter Amme

\$4 eds. \$5.40

ANOTHER OF INDUSTRY'S

MOST-WANTED MEN

7.3mm (30 cal)

GAME SPORTER

softhern beating. I

G-SHOT GOLT ACTION

Industrial Electronics Technician — knowledge of mathematics, drafting, basic electronics required. I.C.S. can help you master these subjects.

SEE SPECIAL OPPORTUNITY CHECK-LIST -- PAGE ST

TWO GREATEST RIFLE BARGAINS

- EVER OFFERED! *

GUNSMITH TO YOU \$19.95

absolute excellent conducted surplus rates army run in absolute excellent conducted, our own gussent is machines and precision crueras harrel to 32" sporter telegib, estimated servers in nights, elters the hard mountain (red) which stock to aporter contours, refeeds barreled action perfectly checks headspace trugger pull (guar aght, triags) Please return this gas for fell refund if it is not perfect to every respect three our perfect. A sporter for all integrands. It should belt action to perfect.

MANNLICHER CARCANO CARBINE

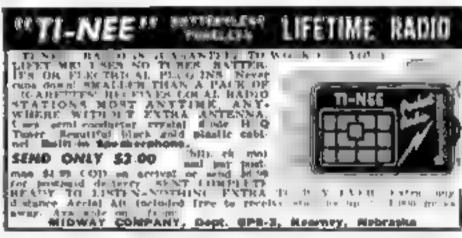
Mere to the hardbitting, extremely accurate and powerful Carcano carbina, all on led parts. Butt with famous Mannischer action. Stress guaranteed good, Compact, fast handling deadly on big game 7.35 MM SOFTMORE SPORTING AMNO, 20 rds., \$2.65. Target among,

ve compain on Park Thinks Sand shock, each or money reder For C i) It send 's or more deposit. All stems F O B. Les Angeles Rap, charges collect. Calif resid and 4% utate tax. Test shoot, return in 10 days for full retund if not ideal in our and

THE ELLNER COMPANY

Dont By, 1264 Manle Avenue, Lee Angeles 16. Calif.

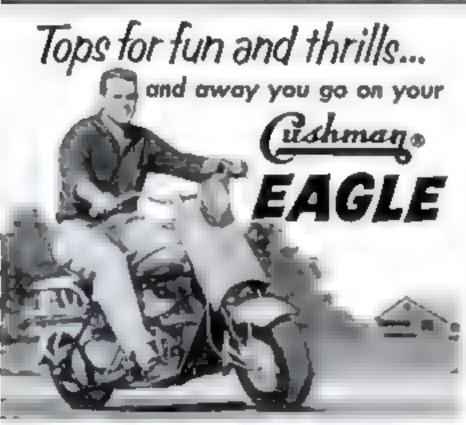
Storting with a heautiful surplus Ewiss army rifly in





KESTER SOLDER COMPANY 4254 Wrightwood Avenue • Chicago 39, Illinois, U.S.A.





Offering distinctive design, a smooth soaring ride, and rugged construction. Powered by the famous Cushman Husky 4-cycle engine. Up to 50 miles per hour, up to 100 miles per gallon,

Ask your dealer for a FREE demonstration

Write for new FREE

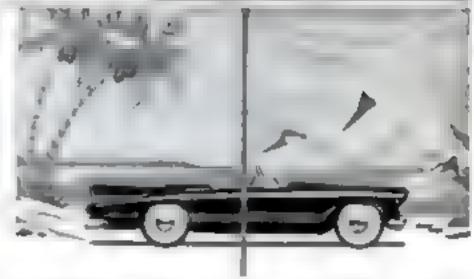
SOLD AND SERVICED NATIONALLY Replacement parts immediately available

Booklet today

Dealer inquiries invited

CUSHMAN MOTOR WORKS, INC.

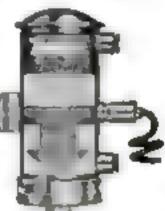
A tubudiary of Outboard Marine Corporation 974 NO. 21st, UNCOUN, NEBRASKA



TROPIC HEAT OR ARCTIC COLD YOU'LL START AND YOU'LL GO!

When a fuel pump has been tested under strict government

supervision and found to work perfeetsy at 114 degrees above zero and as 76 degrees below zero, we think it has proved itself the best on the market. That's what the Bendix* Electric Fuel Pump did, Positively eliminates vapor lock. No other pump even close to its price class could match it. Better get one for your car. (Send for free illustrated folder.)





FEBRUARY 1958 273

BEAT HIGH BUILDING COSTS

Bulld a Liberty Home yourself ... or direct its construction



It's Easy to Save Thousands of Dollars

You save from \$2000 to \$5000 depending on the home you buy and the amount of work you do yourself You save on material, contracting, labor costs, middleman's, architect s fees

46 MODERN DESIGNS . Spacious 2, 3, 4 bedroom plana, I, 113 batha. Brick, siding or shake exteriors Build with basement or utility room.

YOU GET finest quality pre-cut framing, finish lumber; nails, bardware, paint, windows, duors, roofing, aiding, etc., complete plans.

ONLY 10% DOWN FINANCES MATERIALS

Send 50c for colorful, illustrated, 56-page catalog

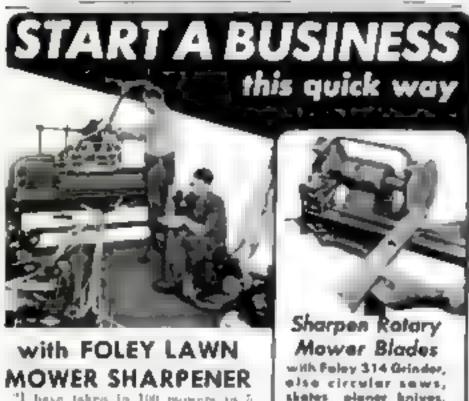
JBERTY HOMES

Lewis Manufacturing Co. # 1382 Lafayatte Ava. # Bay City, Mich. Enclosed is 50c for your big Liberty Homes Calalog

NAME

STREET or R F D

STATE



I have taken in 100 moneys as 5

skates pluner knives,

Water. My marrow has not lost steell to 2 months and everything I take in he who all groter from Otto Zachar a.

Here is a business you can start in space time and begin to make a CASH PROFIL right mean. The hamber me to 1 or 4 movers get that and they have \$2.00 to \$3.00 for hand movers. \$5.00 to \$8.00 for power mosers.

FREE ROOK shows him to thatten power insmets PREE PLAN tests him to start your own home bust ness. Much con in miles and su esman will call.

FOLEY MFG. CO., 200-0 Foley Bidg., Minneapolis 18, Minn. Send FREE PLAN on laws mower business and Special Combination Maney Saving Offer.

ADDRESS.

POWER

274 POPULAR SCIENCE



ROSCO VEST POCKET .22-Brand new 6-shot German revolver that wells in the \$28 \$30 range. A tight accurate well made piece. 3" Bbl., 5" overall, Fires popular Amer. made .22 short ammo. Side gate loading. Has a fine steel rifled barrel with blade front sight. Excellent for target or panking 10-day money-back guar Norkel plated as shown \$.6.9a A.l. Blue finish \$14.95. For C.O.D. send \$7.50 deposit. Leather halster \$2.25. Send check, rash or M.O. to: SEAPORT TRADERS, INC., Dept. 97, 409 E. 12th St., Los Angeles 15, Calif

ware for rolling or aliding doors make work benches, tool

christs etc portable 3" diam bail bearing skate wheels mounted side by side on 1"," x 4" shaft. "a" bigh \$2.90 retailer Closing out at \$9c each 4 for \$2.50 100—\$39.50 Prices FOR Houston, BAROAINS OALORE CATALOG 106

RERO PARTS SUPPLY, Municipal Airport, Huncles 17, Taxos



BARRON Drill



Brandon the usefulness of your drill press with our Rotary Planer, Surface and Drum Sanders, Router and Mortising Bits Molding Cutters . other essential accessories. Complete catalog and price list mailed on request.

BARRON TOOL CO. INC. 320 Architects Bidg., Detroit 1, Mich.



S PE HA . NO HE E ANY



se a his for 6 york 2 poses to 12 york

JSM PRODUCTS CO.

E & CAST FROM BD DEPT 73 CO VE AND 24 OH O

The oil purpose Pirerench cames equipped with Universal gear jaw Tool made of chrome maily forged steel in gun metal finish form fit handle. Adjustable from 0 - 1/2 Thousand pound pressure grip for bench-vise jobs on the spot For

mechanics, home handymen, plumbers, electricions, formers. Pipe gear jaw or Wire gear aw extra at \$1.50 each. Corrier pouch free with purchase of Flierench and extra jaws. F.O.B. Two sizes:

7" 16 oz. (with Universal jew) \$7.50 $8V_2$ " 20 es. (with Universal Jaw) \$8.50

RENCH COMPANY of AME Beverewood Avenue, Chicago 40, Illinois Dept. P.

Offer Your Motorist-Friends

GUARANTEED Improvement III MOTOR COMPRESSION

...PEP...and ECONOMY...

No matter bow old your friends' cars are, unconditionally guarantee them astonishing increases in compresston, gas macage and oil saving, even let them judge for themselves! Amazing new product backs you up 100%, hands you opportunity to make big money Build Big-Profit REPEAT Business Spare Time With

BIGGER, BETTER

Forks try MOTOR OVERBALL and re-order from you the e and again. Pleet of craints buy large quantities on during You-Be-The Judge Guarantee Sensational Indener fent Laboratory Report proves that only moments after MOTOR OVERGIAL L is added to engine oil compression thereases up to 58%, gas mittage up to 54%, ast saving up to 500%. New larg r size, still only \$2.98, make to to \$1.78 profit on each one. Now with oil-stabilizer Formula X-303 for faster cold-weather starts, conversating in summer!

FREE! Tear Out This Ad

and rath it with your name address for complete somey making plans act in) copy of acasalimni Lab Road Test Report, during transactive all FREE, no

POPE CHEMICAL CO., 224 W. Huron, Dept. D-4



Heavy Duty, All Steel

WHERE ELSE can you get 4 drawers with hadt-in locking system, sliding on compound glides -at this price! Baked b ne-gray enamel. 26" x 121g" x 121," Your money back of not satisfied Write for bulletin, describing this and 12 other models.

HUGT MANUFACTURING CO. 532 No. Wheeler St., St. Paul 4, Minn.



SCREWS AND BOLTS CAN MAKE A

BIG DIFFERENCE

in the permanence and quality of your workshop projects.

QUALITY MAKES THE DIFFERENCE

BUY 'EM BY THE NAME

BUY 'EM BY THE BOX AND SAVE!



fink for them at your hardware or holiding supply store



TRY SUPERSHOP FREE

- WE PAY FREIGHT
 - YOU BE THE JUDGE
 - EASY PAY PLAN

 Why does Power Tools Inc. make such an unusual. offer? Our business is manufacturing and selling

power tools direct to people like yourself. We have had experi ence with hundreds of thousands of people regarding their home workshop requirements. Super shop meets these requirements. This has been proven.

The combination of direct selfing, advanced design and

officient manufacturing enables us to give the greatest power tool value in America today. That is why we have the courage to make you this offer.

This free trial is truly free The machine is prepaid to your door and if it does not satisfy you, you return it at our expense. If you keep Supershop you pay the low factory-to-you cash price - or easy payments to fit your budget.

Write for free information. Mail the handy coupon or send a postcard. Well mail you colorful brochures on Supershap — and full details on the FREE TRIAL HOME OFFER, Absolutely no obligation.





POWER TOOLS INC. AFLOIT, WISCONSIN

204 YATES AVE.

POWI	R TOOLS	INC	*	BELOIT, WIS.
	complete	informatio	n abo	es on Supershop and out the Free Home obligation.
NAME.				
ADDRE	\$\$			





CLOGGED SEWERS? - CLEANED INSTANTLY | SAVES PLUMBING BILLS -

Cal Cat to Feb 1st Just in reduced as a Free land, et an New Discovery which enables the Hage discover Jan 2 of Fact by Maintenance is given may to aged Sower Discover Let any up can operate to a new Plumbers Flushing Gue which to associate the new to shape of water coarsing the new to be a support with the fact and appear with the first papear with the 1st IIII 108 higher land Health TO STREET Shape hill coarse in the treater Rass, Rand Shate, and paper melt away recann to when services by the Hammer the blow of the new and There is no need to require with or pipe of

There is no most a remove with or pipe of farcase Trap. A special attachment allows water to fine learn the faces through the translate water is the leasest on the pipe. Yenta it stacks are no be acce as force tetra to size as in the pipe with a special for the water are light how wint a the Plumber of each action worth a COSTLY PLUMBING BIALS SAVED? Tear has act aft and will a lease and a lease bearing it for FREE BOOKLET. Oby that the No meent will call A goot entitled the doubt a lease of the page through the call a goot entitled to the me I hope K. are \$ 1 20 MILLER SEWER HOD CO, DEPT PS f. 4840 N. Gentral Ave., Chicago 36, Uflegia.



Super Filer No. 11 to pin and elicepens hand and circular saws 6° to 10° with all teeth eritate p height death puch bevel when file has hardened steel roler, teeth are followed bow runs \$9.95 true with no side pull in \$9.95.

SUPER SAW FILER NO.

anw set automatically sets teet at 10" \$2.95



BOWEL CENTERS

Is there inser be made to be proposed to be been formation for being the bear bears

bules Paire for 12" hm 12" boins

can ro a death, and e pair for al angue pair frech al angue and ca ibraied Lac ip any whe or clamp includes ale

Automatteatly

MONEY BACK QUARANTEE—CATALOG FREE D. MITSHIEY, 5908 Hallywood Blvd., Hollywood 28, Cal., Bopt. 5-28



The Modern PLASTIC for lasting Home Repairs

PERMANENTLY mends cracks of holes in wood tile, stone or planter. Slicks and stays put—Does not chip shrink or fall out Easy to use Economical Mold it, chisslit polich or paint it. The big 4 lb. can is obtainable from your lumber paint or hardware dealer at \$1.25 or will be shipped direct postpaid lin U.S.; for \$1.50. Complete satisfaction guaranteed or your money refunded. Order how

BONALD DURHAM CO. Sex 804-V Des Meines, Iowe

SRW



With our six inch had elsel rullers you can make being ful mound go for private frames furniture, at a house countries in furties as shown

DIRECT FROM FACTORY!

One lock wide 01 bit 115 (sich wide 62 th an Presided Quaranteed Link & Fo dec free State bole

ADDRESS A. BANDETROM



TARING that MAGNIFY

State State

WEAR THEM ON 10-DAY TRIAL For those who need on he magnifying glasses only Maylity helpful for must beopts over 411

Just name address and are When planes arrive my feet man \$2.55 plan areal! C.O.D. rhutte Ur bend there are N.O. now for E.F. and we pay protect harings action apparantain, or parchase select promise passages.

CASE

MODERN LENS CO., P. O. Bex 92, Cooper Sta., H.Y.C, 3

When Writing to Advertisers Please Mention Popular Science

EASY TERMS

ONLY \$9850



DETAILS AND

EASY PAY PLAN

NOW! HOME CRAFTSMEN CAN OWN THIS PROFESSIONAL ARC WELDER

Now you can own a Trindl full 125 amp Industrial Welder at a price far less than smaller machines. With a Trindl 125A you can weld metals up to be inch thick. Operates off either 110 or 220 rost has, properly wreted. It heat stages from 30 to 125 amps, blake and repair anything of metal around the home, garage, form or shop, like a professional No previous experience or training needed, Full dout yourself instructions with each machine. Complete only 19830 Lob, factory, or write for details. Trindl manufactures a complete line of heavy duty weiding machines. Dealer inquiries invited.

TRINDL PRODUCTS Ltd., Dept. T3-8 1807 Sc. Clark St., Chicago 16, M.







Measure any object up to 4 inches with this handy caliper and read the size directly on its precisely calibrated black-on-white scale marked

in 32nd's, Squeezing handle opens caliper; a spring closes it. Narrow curved legs reach bottom of grooves and slots only 1/16 in, wide. Thumb-screw locks measurement for using caliper as a gauge, indispensable to machinists, woodworkers, draftsmen, inspectors, hobbyists.

Buy at your hardware store or order direct. \$950 Money-back guarantee. Postpaid '

ASTER Specialty Co. Inc. 3724 Monstor Ave., Minneapolis 25, Minn.

Regularly \$25.10! super buy.

Armstrong Standard sets including sleeve rachet for Morse taper shank, square taper socket and short spindle with feed screw-\$3.95 Postpaid. CODs require \$1.00 deposit.

Ance Parts Supply, Municipal Airport, Houston 17, Texas

Take BELSAW Partiable Savonill right to the trees—form and volu-

able lumber for home and form - sell to been words - make up to \$50 a day custom sovering for un-globers. Re.SAM lests a bistime. He crow reeded. Fower with tractes er auto origino. Beginners get excellent results. Sond hebig 🖮 FREE MOOR,

BELSAW MACHINERY CO. Kanner City 11. Missour!

Buy U. S. Savings Bonds

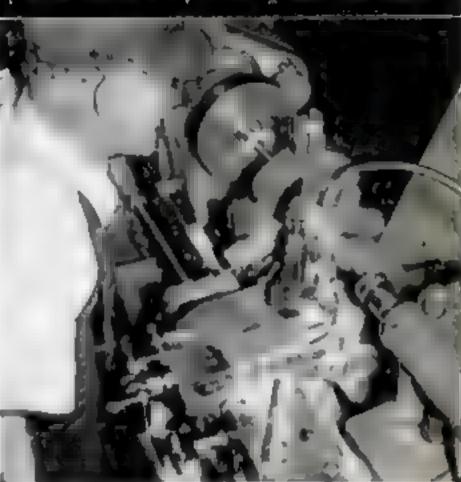


powerful (2% h.p.) self-propelled lider-cultivator makes gardening

a pleasure! Has a beautiful self propelled 22" twinseconds—for just \$44.50; and the Safe-Speed Edger for only \$27.50. Write today for free folder and nearest dealer's name. spindle rotary mower attachment you can hook on in

ROTO-HOE, Dept. P-18, NEWBURY, OHIO

Built to Last



South Bend 13" and 141/2" Lathes

Years mean nothing to these precision lathes, as they go on and on turning out necurate work at low cost with ...

- Microfinished bearings with no metalto-metal contact.
- Belt drive to spindle for vibration-free operation—no gear marks.
- Precision-cut gears and ground shafts for smooth power feeds.
- Rugged, rigid construction that will stand up under hard usage.
- Exacting workmanship by skilled craftsmen.

SPECIFICATIONS	13*	1415"	
Swing over cross slide	71,"	812"	
Massmum collet capacity	1 **	1 36 ⁴⁷	
Spindle speed range	70 940	15-875	
Shipping weight, 7' bed	1760 (bs.	2089 104.	
Base price	\$1675	\$2074	

Write for FREE 80-page catalog.

SOUTH BEND LATHE

South Bend 22, Indiana

Builders of Lathes, Milling Machines, Shapers, Drill Presses, Pedestal Grinders



Plain Facts About Correspondence Schools

(Couringed from page 129)

an experienced teacher, with a passion to impart, drags or even tricks the student

into comprehension."

Of course, impassioned teachers are rare in any kind of school. The correspondence people make a real effort to keep students interested, peppering them with brochures, newsletters, pep talks, as well as long personal letters and handwritten comments on exams.

With every lesson comes the examination, which looks like the tests you'd get in any other school. One difference: It's "open-book." You are encouraged to refer to the lesson while doing the exam.

Check a sample examination critically. It's one clue to the quality of the course.

Ask yourself these questions:

• Will you have to understand the lesson thoroughly to complete it? Or is it nothing but a copying exercise?

 Will your answers have to be graded by a qualified instructor? Or could that

job be done by a clerk?

Does the examination help you learn more (by clarifying and emphasizing important points)? Or does it simply test what you have already learned?

Some schools use true-false or checkthe-right-answer tests. Most often, though, you will have to solve problems and

write out essay answers.

Who are the instructors? In ICS' Big Red Schoolhouse—and most other schools that teach a variety of subjects—they're women. They are high-school graduates who learn a subject by studying the same lessons you do. (This is not much different from the standard university practice of employing graduate students to correct undergraduate papers.) Some of them have spent 20 years or more on the job and have become highly expert in their particular fields, despite a frequent lack of practical experience in the work. Directing the instructors are several echelons of supervisors, many with outside experience both as teachers and as workers in the field they teach.

It's different at some of the bigger schools specializing in very technical subjects—electronics, particularly. There, every exam is corrected by a man who has both theoretical and practical knowledge

in the field.

Some other unusual features of the

ICS system stand out. Two examples:

 Your mistakes in grammar and spelling are meticulously corrected, no matter

what course you are studying.

You can't fail an exam. The worst grade is W—withheld. The exam is sent back for you to do over. There's no limit to the number of times this can happen; you just keep trying until you pass. Otherwise, ICS' grading is tough—you have to score 95 percent to rate an A, and at least 75 percent for a C, the lowest passing grade.

In some radio-TV schools, not only can you fail an exam, you can flunk out completely. Early in the course there is a point of no return. If you consistently fail the tests at that stage, you'll get a

It's an honest man who will go through a dozen anapshots of himself without feeling the urge to tear up at least one. —The Sidewalk Superintendent

polite letter suggesting that you are not cut out for a career in TV repair. Usually your money will be refunded.

....................

Who gets the diploma? If what we have said makes correspondence study seem like work, that's intentional. You'll have to devote the equivalent of an hour or two almost every night of the week, for a year or more, to get anywhere with a worthwhile course.

That's not easy for a young man with a family and a full-time job. Only one in five sticks it out to the end. (The attrition rate at regular colleges is somewhat better; about half of those who start

graduate.)

But the rewards—that better job, more money—are there. Correspondence training is a popular and effective route ahead in such attractive fields as accounting, engineering, drafting, TV repair (one fourth of all Certified Public Accountants are the product of home study).

The number of students has doubled in the past decade, and will almost certainly double again in the next. This growth comes none too soon. In the titanic struggle for world leadership, America's greatest weapon is trained men—which are exactly what correspondence schools can produce.



AMAZING NEW KIND OF POWER SAW



OF DIFFERENT JOBSI



Follow a chalkline without "wandering." You guide it and relax because the Wright Robel feeds itself! Leaves a smooth mill-edge finish—the only power saw that does true precision-cutting!



Women or youngsters can do it! Neither strength nor skill is required to handle the tightweight, supersafe Wright Robel. Smooth, self-feeding cutting action—with no whip, kick or grab!



Improve your property? Build a rustic fence; bridge a ravine; clear out shrubs and undergrowth; trim hadgerows; build a play house or garden "tee house." It's easy—and fun—with a Wright Rebal!

Totally different from any other gasoline-powered saw you've ever seen! Works on entirely different principle: reciprocating blade, NO CHAIN! So SAFE, so EASY to use for EVERY kind of outdoor sawing job—for farmers, hobbyists, outdoorsmen, nurserymen, orchard owners, right-of-way and park maintenance, pulpwood opera-

with a single cut—yet follows a chalkline and leaves a smooth mill-edge, for precision cutting. Costs less to operate and maintain. Pays for itself in just a few jobs!

\$18950

includes 20" blade

F.O.S. Shebaygan, Wis. Price applies in U.S. enly Dealerships available!

No other Power Saw does so MANY jobs!

FelisLimbs

Bucks

Undercuts
 Prunes

Clears land

- Precision-cuts
- Leaves Mill-edge
- World's SAFEST Power Sawl

THOMAS INDUSTRIES INC.

POWER SAW DIVISION

Executive Offices: 410 S. Third St., Louisville 2, Ky.
THOMAS INDUSTRIES INC. products: Moe Light and Star Light
lighting fixtures...Wright power saws...Radiant opal glass...Ideal
bothroom cobinets...Electric Sprayit paint spraying equipment

FREE DEMONSTRATION

See your local Wright Saw Dealer!

Send 10c for illustrated "Easy Steps to Woodcutting" booklet —shows dozens of do-it-yourself projects for fun and profit!

			The state of the s
ALC: UN		The second second	THE RESERVE AS A SECOND
			TODAY!

Thomas Industries Inc., Power Saw Division 410 S. Third St., Louisville 2, Ky., Dept. 58-8

- I enclose 10¢ for handling and mailing illustrated "Easy Steps to Woodcutting" booklet—and full facts about the NEW Wright Rebel power saw.
- I am interested in becoming a dealer.

Name______

Address Zone State

Congregation receives

THE ONLY COMPLETE ELECTRONIC COURSE IN TELEVISION

RADIO, RADAR, SONAR, ELECTRONICS

Only CTS offers you COMPLETE training in all phases of Electronics. Why be satisfied with less? The new Christy Shop-Method Home Training makes learning interesting and easy. You learn Radar, Sonar, Electronics, Radio, Television. No previous experience needed. You learn by working with actual equipment. Makes learning fun. Speeds your progress. Helps you understand quicker and remember longer.

You get comprehensive training starting with your first CTS lesson!

The complete knowledge CTS provides you with, gives you a broader knowledge, a greater understanding which will mean more jobs and a higher income for you for the rest of your life.

HOME LABORATORY SENTI 19 TRAINING INSTRUMENTS INCLUDED

With CTS COMPLETE Home Training Course, you receive a Home Laboratory to assemble, use and keep for years of peak performance. You receive a Multi-Tester, Oscillator, Signal Tracer, Oscilloscope, Signal Generator, Electronic Timer, Regenerative Radio, Giant-size Television Receiver (optional) as well as many other valuable electronic devices. With these you will be able to make hundreds upon hundreds of exciting experiments.

EARN WHILE YOU LEARN! EARN \$5.00—\$6.00 PER HOUR

Or MORE while still studying! Almost from the very first you receive training that enables you to repair radios and television sets for friends and neighbors. To install and service electronic computers, communication equipment, protective equipment for police and fire departments, etc., etc.

FREE BOOK.....SAMPLE LESSONS SENT

Get all there is to know about the Christy COMPLETE Electronic Course in Radio-Television-Radar-Sonar, etc. A complete, colorful, illustrated book on Electronics sent without obligation.

Also, we will send you Two sample lessons showing how the new CTS Shop-Method Home Training Course will train you for making big money in your spare time and for building a bright future for yourself.

CHRISTY TRADES SCHOOL, Dept. T-404, 4804 N. Kedzie Ave., Chicage 25
SIGN, MAIL FOR THREE BOOKS

Christy Trades School, Dept. T-604, 4804 N. Kedzie, Chicago 25, III.

Gentlemen:
Please send me, without cost or obligation, two FREE lessons and the new 24-Page illustrated book telling all about the CTS Master Shop Method Home Training Course in Radar, Sonar, Television, Radio and Electronics, and the many opportunities

City..... Zone... State.....

MAIL COUPON TODAY FOR CATALOG! CAPITOL RECORDS Brings you this Amazing

IF YOU AGREE TO BUY FOUR SELETHE CAPITOL RECORD CLUB IN TH

TAKE



12" LONG-PLAY HIGH FIDELITY BEST-SELL

NAT 'KING'

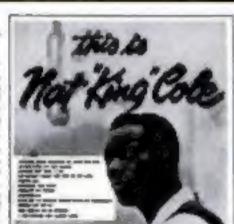
COLE Here is the man whose warm, pleasing voice sings of fove-far all all those who know how sweet lave can be! Twelve favorites including: Annabelle, Dreams Can Tell a Lie, Never Let Me Go, Ia the Ends of the Earth, Toe Young to Go Stepdy, I Just Found Out about tave, etc.

AN AMERICAN IN FARIS

THE HOLLYWOOD BOWL IN

Statement of Pitchia Statement and Statement of Statement

LEDBARO PENNARIO, par



GERSHWIN
Rhapsody in Blue and
An American in Paris.
Music lavers around
the world consider
George Gershwin the
greatest samposes
America has prodused. Here is a special treat-Gershwin's
twa most famous som
positions, brilliantly
played by the Hollywood Bowl Symphony Orchestro with
the plane virtuose
Leanard Pennorio.



to the record club that brings you all the CAPITOL and Angel stars!

Schahororado



STOKOWSKI

The world's mast celebrated living conductor performs the
outstanding LANDMARKS of his corest
in rich new Full Dimensional Sound!
Full dress performonces of works by
Both, Sibelius, Debussy and Strauss IIn
the future Capital will
bring you other famous classical artists
like Menuhin, Mistein,
Leinsdorf, Galschmann, Fukusny, I

SCHEHERAZADE, William Steinberg conducts the Pattsburgh Orchestra in Rimsky-Korsakav's fabulaus fone poem that can ures up images of Oriental splendar... of heavy-lidded hazem princesses, placening National cruel

Collabs and beginful slave girls performing in ractic baroons. A new and brillight recording



JUDY GARLAND

Judy is that once in a generation on terto incr — and proves it in this un would be um in

pounded of whimsy, possion and just plain entertainments if feet a Song Coming On April Showers, many others. Un Capital's galaxy of seconding stars, Judy shores top billing with such great gall surgers as June Christy, Anna Maria Alberghess, Jane Framan, etc.

POST PARAMETERS TENS

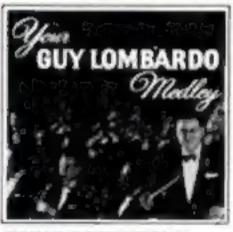
THE KING AND I Here's the thrilling score from Fodgers & Hammerstein's hit musicall This original

Mammerstein's hit musicul? This original movie rost album stors Debarah Kerr and Yul Brenner. Hella, Young Lovers. Shall We Dunie? Getting to Know You. II others.



TENNESSEE ERNIE

Myrins - that bring you pears and comfait that watch your heart and reside that watch your heart and reside that the Charles of Ages My Task The Old Ages County to the Carden Sweet Mour of Prayer of



GUY LOMBARDO Abuga

helping of sheet latering and danting parters on by the band America has loved langest and best A full 40 tunes with apart the memory filed years from 1970 til today. Satisfying music that you'll come back to again and again.



STAN KENTON

preatest in "progressive jazr" - Lov Peanut Vendor, Cencerto to End Consertat, 11 others restorded in be sound. As a member, you'll hear out Copital jazz greats: Ellington, Ha James, Benny Goodman, etc.

HOW TO SAVE MONEY on the Albums you want... from the greatest of classics... to the biggest of hits!

YOU GET THREE ALBUMS FREE AT ONCE! Help your if to ANY 3 of these 12. Capital long play albums. They is your as a gift if you soin the Capital Record Club and ter to buy as few as four records during the caming year. In Member you will have about 100 selections to choose on in the next 12 months — and you may resign, if you ash, any time after your fourth purchase.

THE GREATEST NAMES — THE GREATEST SOUND! aly the Capitol Record Club can boast such a list of start, orld-famous musicians and performers under exclusive attact — from the latest recordings of Stukowski to the test Sinarra albums — are yours to enjoy in trying high-lettey. And Capitol's repercory of music — from the easest classics to the newest him and show capes — are reproduced in the "big sound" that has made Capitol e easy of the record industry.

3. FREE BONUS ALBUMS! For the records you decide to buy, you pay only the regular price—plus a small shipping charge. Albums retail at \$3.98 or \$4.58 and bills are payable? days after records are to your hands. Each time payable? days after records after your first four, you get a 12" long play BONUS ALBUM worth at last \$3.98... shouldtely FREE! It's pust as if you were gening 50% interest on the money you invest in your record collection. You rut the cost of your records down to a fraction of the usual cost. Thus, you can give yourself and your family an even bigger record collection that will earlich their appreciation of fine mann.— soday and in years to come.

4. UNLIMITED CHOICE! Enroll in any of the three divisions: Classical Best-Seller Hits and Show Music ... or Hi Fi Jazz. Each mouth you'll receive a colorful and encettaining magazine which describes the carrent record selection of each division, and an alternate for each. It want the selection of your division, you need do not. Or, if you prefer, you may order from any other division from Capital's fabulous catalog of extra selections—WITH FULL BONUS CREDIT. If you don't want a rethat month, simply notify the Club on the form proviand none will be sent. But harry to get your THREE I albums right now—one is yours free for joining—the two are a gift in advance of your first two booms rec

5. 160 RISK GUARANTEE! If not delighted, you si return the three albums within 7 days and your membe will be cancelled. There is no other obligation.

Mail the coupon immediately to the Capitol Record C Dept. A-108, 100 Sixth Ave., New York 13, N. Y.

Congressed making

performance out of this world...



STARFLITE V-4

with Evinrude's mighty V-4 power and magic "Seal of Silence"

For starry-eyed dreamers... Starflite is a dream come true! Its very name suggests performance out of this world. Its low, sweeping V-shape of tomorrow hints of fun to come.

You'll feel its solid take-hold power the moment you touch the throttle. Instant action! Remarkably quiet! Incredibly smooth!

Starflite's compact, perfectly balanced 90° V-engine floats on rubber mounts in a sound-tight nacelle. Power pulsations are wiped out. Engine noise is sealed in.

See the most remarkable outboard motor ever built . . . Evinrude's mighty 50 hp Star-flite . . . nee at your Evinrude dealer's. Look for his name under "Outboard Motors" in your phone book.

Thrilling V-4 performance is also yours in the new Four-Fifty, at low, low cost. There's a glamorous new Lark with Starflite quiet! Power-packed new "35's" and "18's" with key switch starting! A sweet-trolling streamlined "10"! And 3 handy take-along motors! Catalog free—write Evinrude Motors, 4222. N. 27th Street, Milwaukee 16, Wisconsin.

A Division of Outboard Murine Corporation In Canada: Mid. by Evineude Motors, Peterborough

EVINRUDE

quiet outboard motors